the OIL AND GAS JOURNAL

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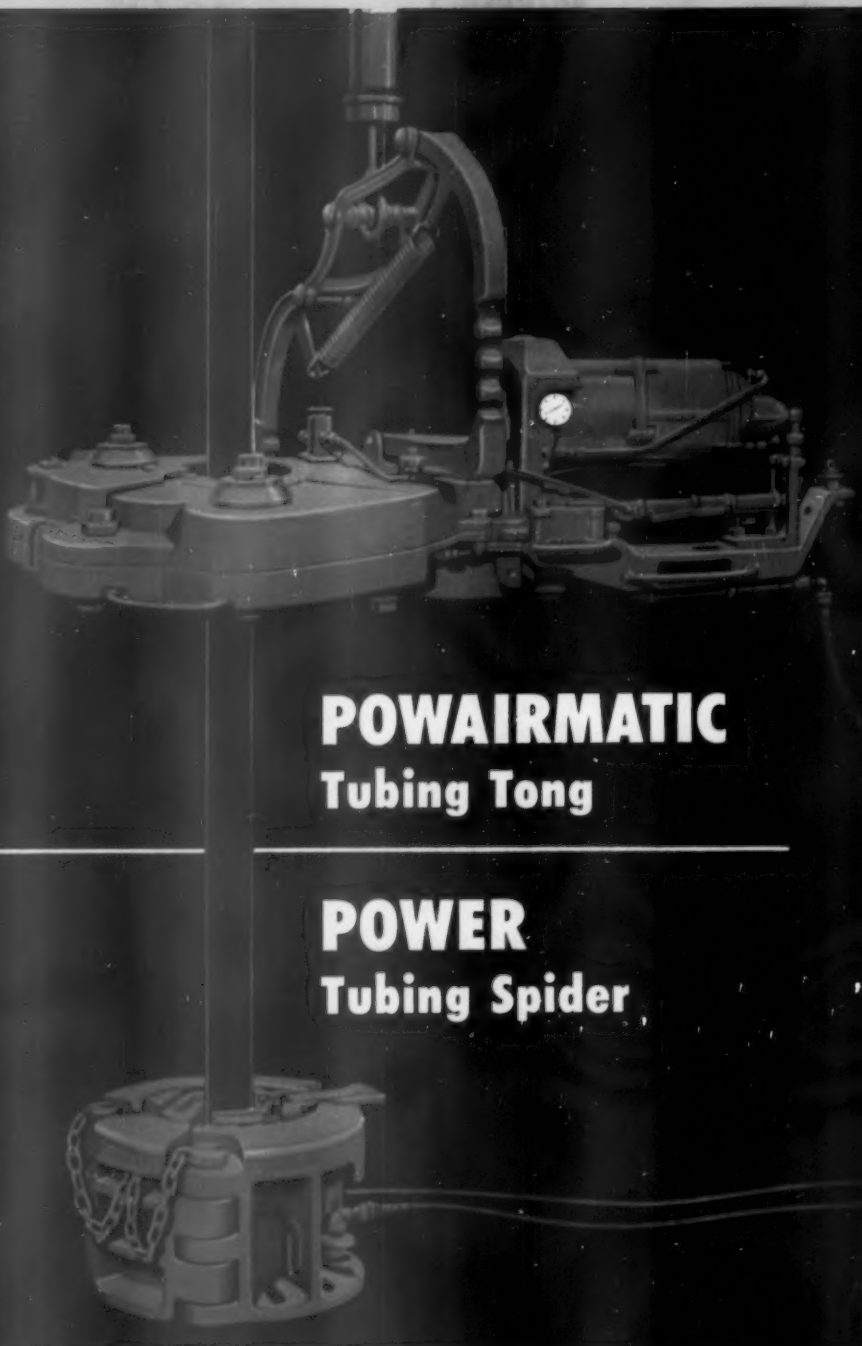

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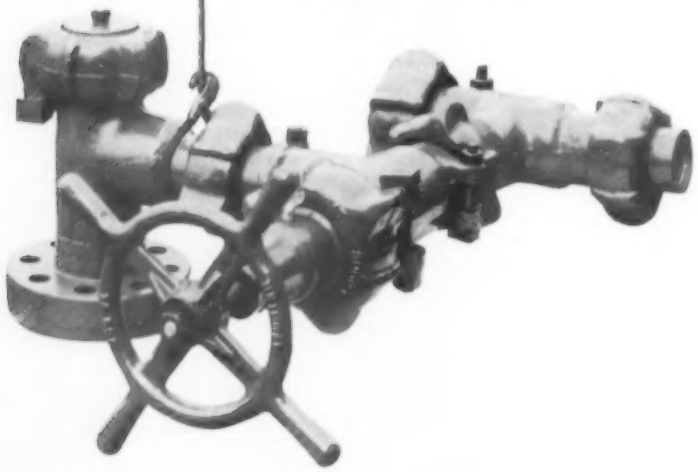
Tools of our Trade No. 7

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 MAY 31, 1954

UNIBOLT FLOW MANIFOLDS

started a new trend — the fabrication of salvageable parts into a compact, strong, lightweight unit that provides everything necessary above the master valve



More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, and more economical, and easier to maintain than ordinary flanged Christmas tree wings.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

The units of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnished in regular forged steel or in stainless steel for corrosive wells — 6,000, 10,000 and 15,000 lbs. test. The manifold is completely salvageable.

THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

the OIL AND GAS JOURNAL

MAY 31, 1954 VOL. 53 NO. 4

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In Brief . . .

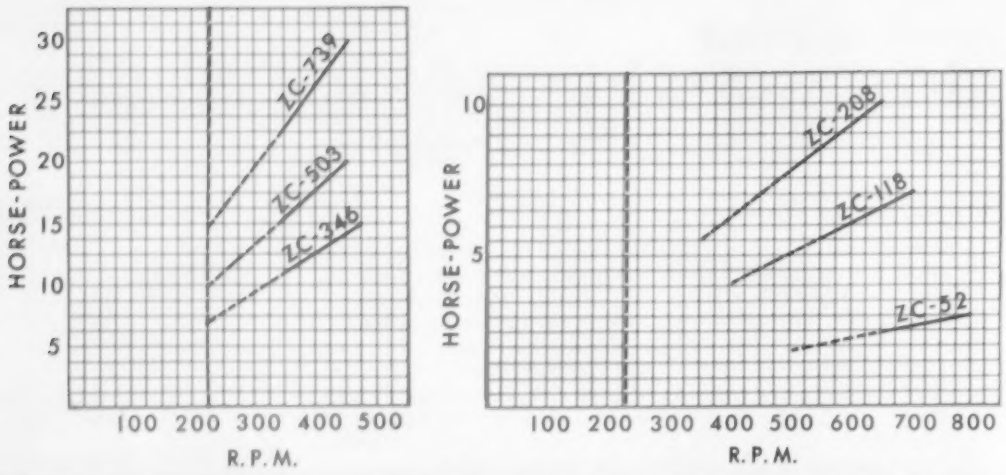
1. VERSATILE . . . Silicones are proving of great value in a number of refining applications. A silicone fluid in concentration of only a few parts per million is an effective defoamer additive for lube oils. A defoamer is also effective in gas absorption units. Silicone coating prevents wax from sticking in molds. Silicones are also used for electrical insulation, protective coatings, in paints, and for a large variety of other uses.

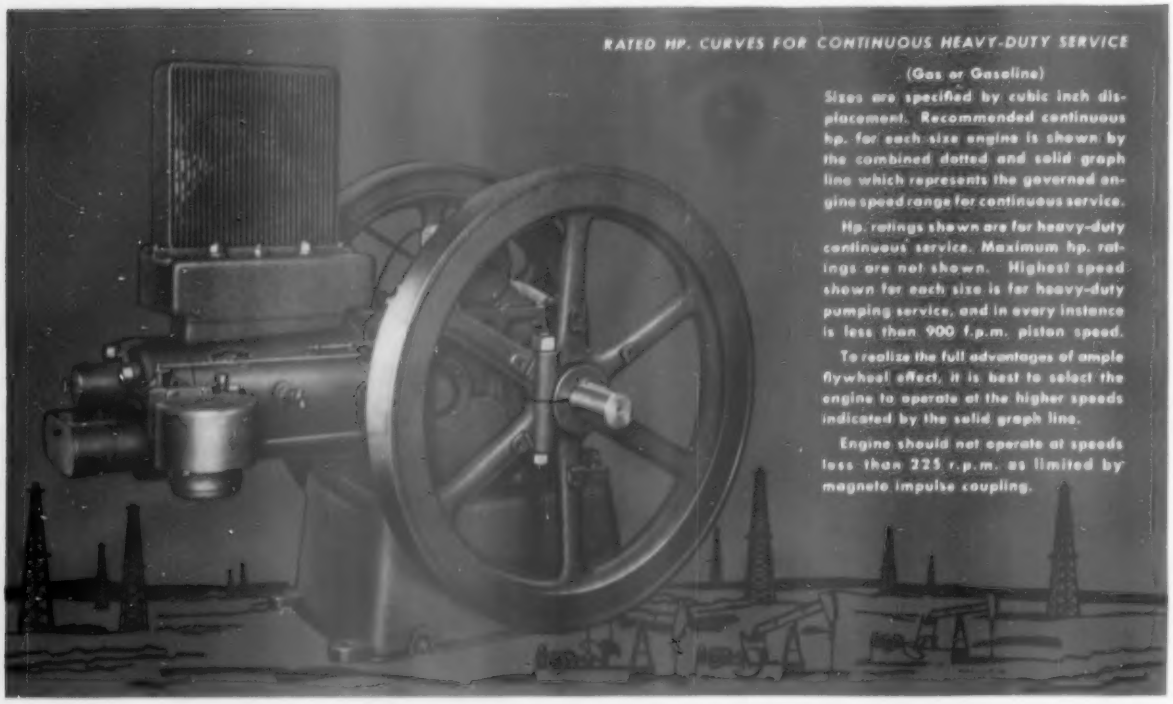
2. IMPROVED FRACTURING . . . Wells having a long, nonuniform pay section have responded to multiple-fracturing process with average oil produtcion increases of 240 per cent. Wells having extremely low permeability may yield commercial recovery if treated to produce deeply penetrating fractures, provided there is adequate oil in place and sufficient gas in solution as a source of energy.

3. GAS INJECTION IN LIME . . . One of the oldest projects of pressure maintenance by gas injection in East Texas lime production shows that increased recovery and continued natural flow make this type operation economically successful. Gas cycling has resulted in recovery of approximately 90 per cent of the total condensate initially in place in the field's Rodessa lime reservoir.

4. LOSSES REDUCED . . . Preferential withdrawal of catalyst fines in the fluid catalyst system is an effective method for reduction of stack losses in an F.C.C. unit. Studies at Shell's Wilmington, California, refinery show that loss of catalyst from the cracking unit stacks is proportional to the concentration of 0 to 20-μ fines in the system. The size-selectivity characteristics of cyclones and electrical precipitators make it possible to segregate and remove fines from the plant. Sixteen months of operation with removal of fines in this manner have not revealed any adverse effect on plant operations.

5. PREDICT HOLE DEVIATION . . . Newly developed practical charts enable the prediction of changes in drill-hole deviation. By using the factors of drill collar size, weight on bit, hole size, existing hole inclination, and formation dip angle, the charts make it possible to determine the fastest and straightest drilling conditions.





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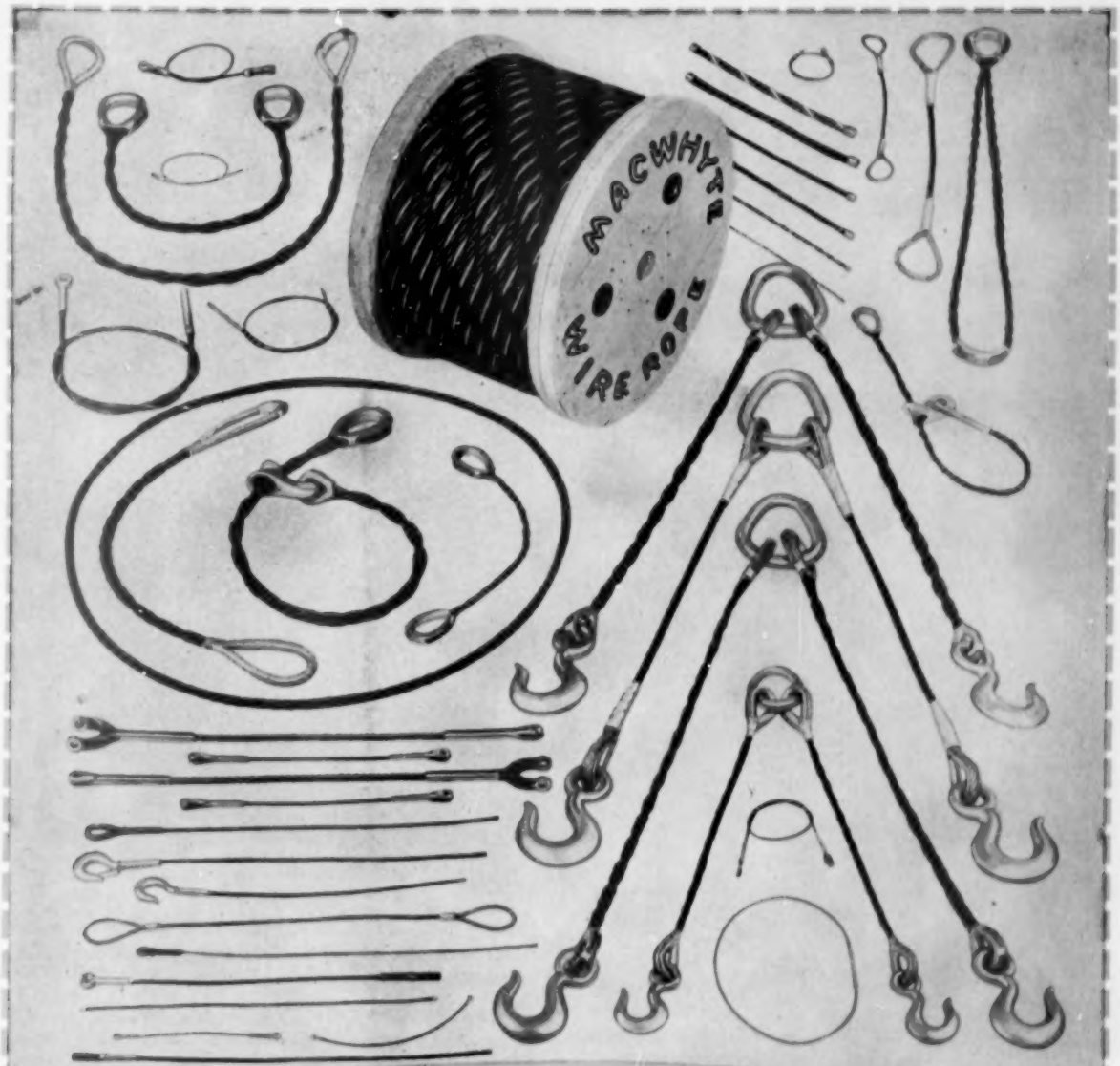

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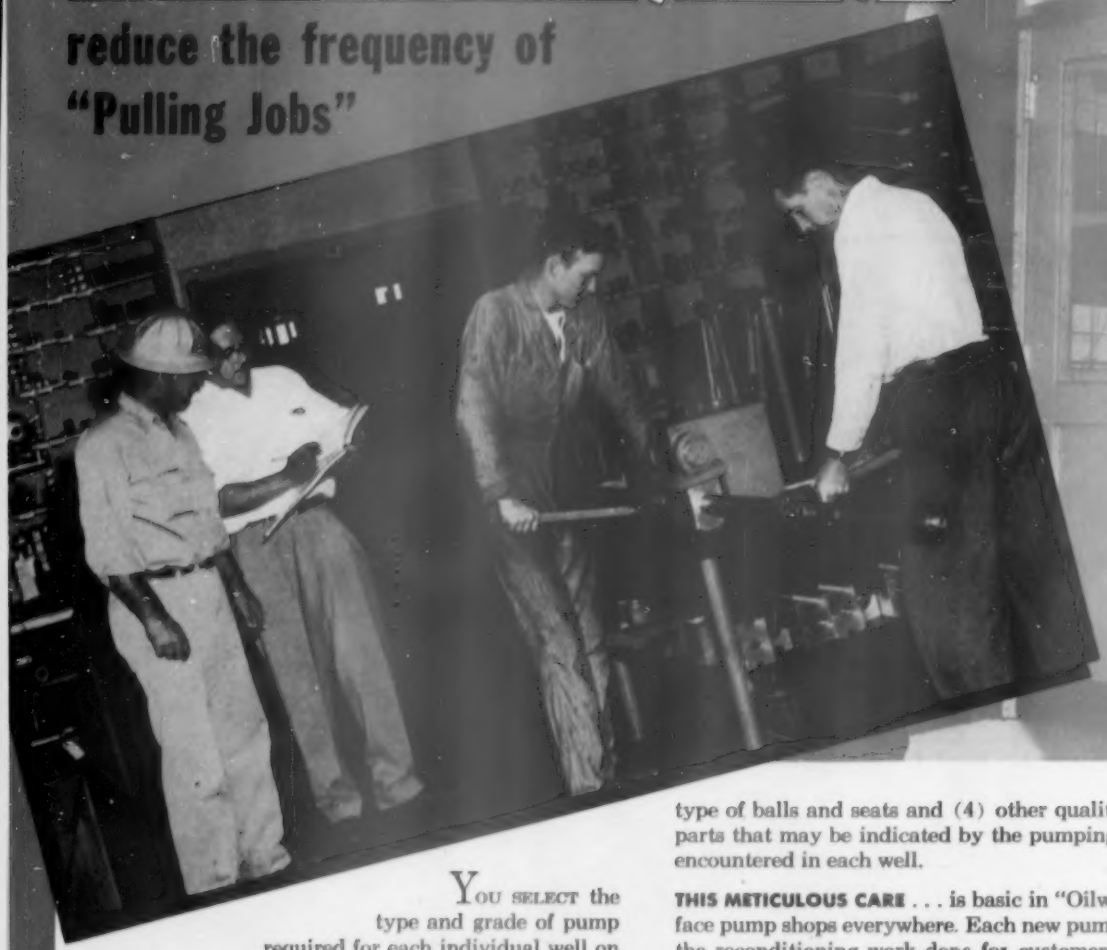

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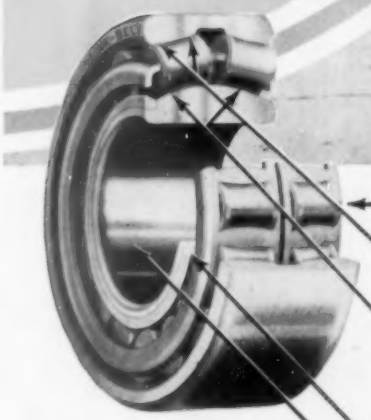

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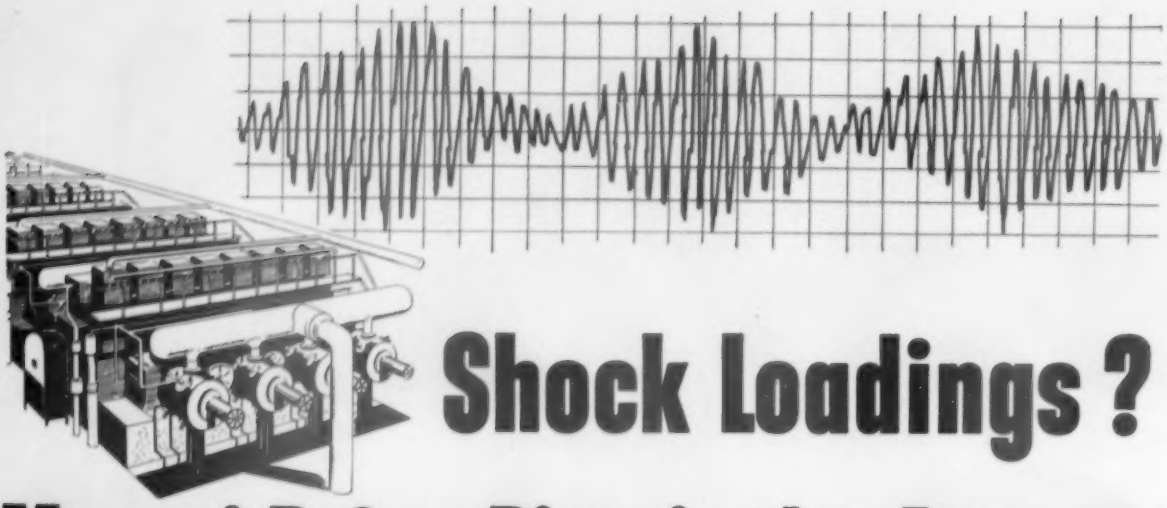

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If you're planning a compressor station, and you're looking for gas pipe that can handle the shock loadings, Mayari R Gas Pipe is the answer. Here's why:

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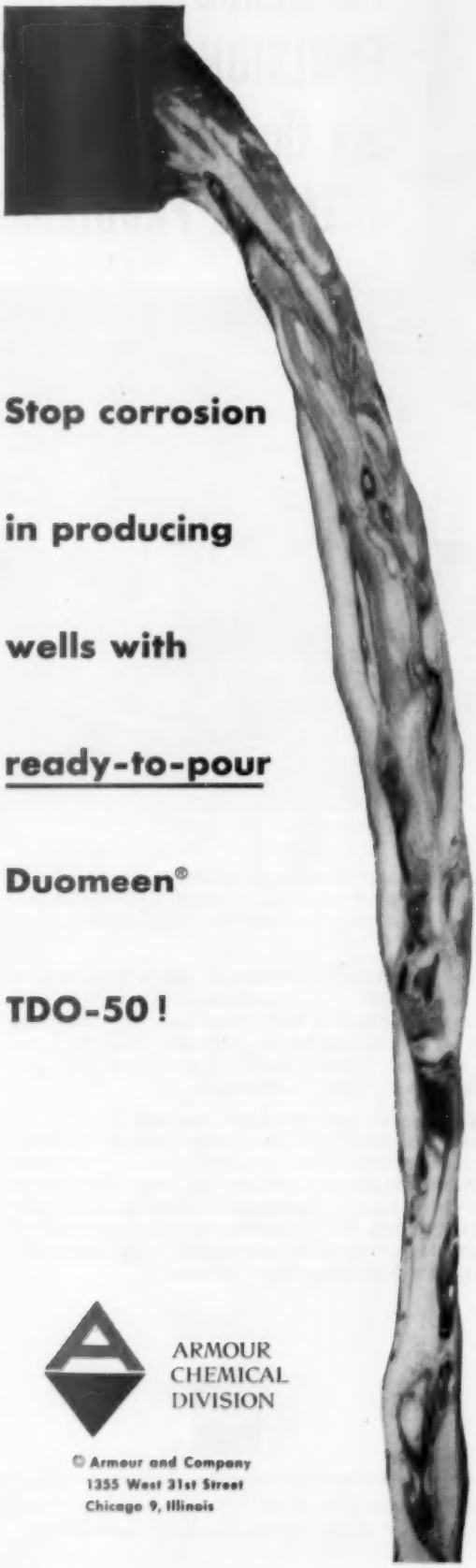

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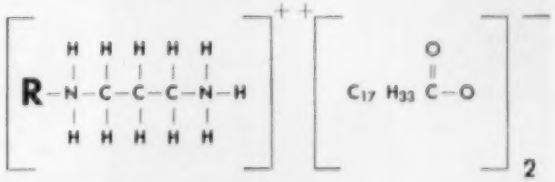

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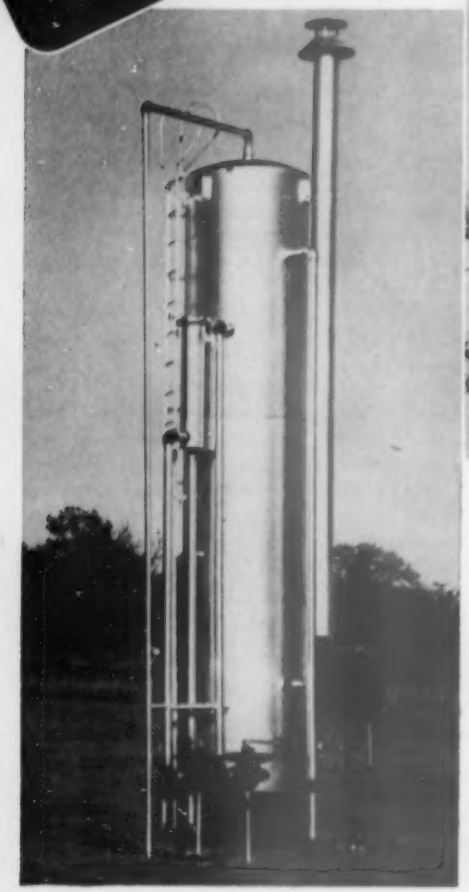

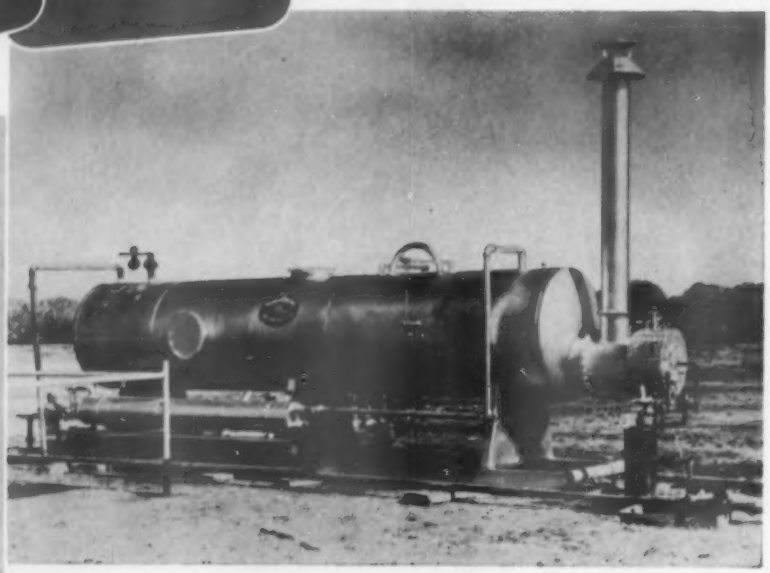

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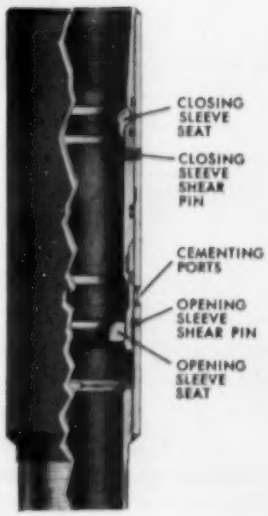

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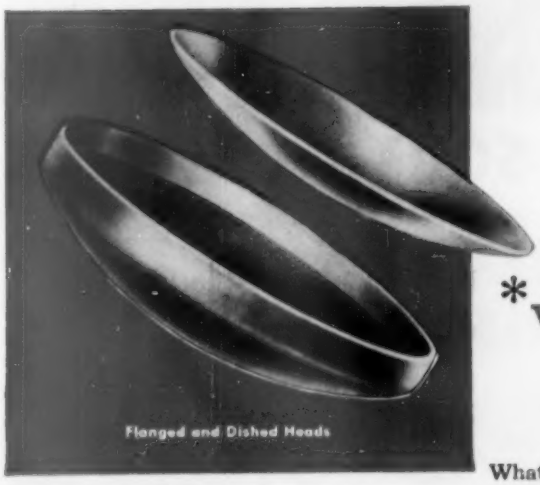

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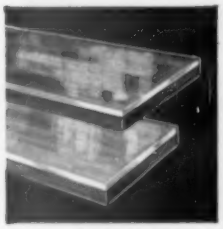
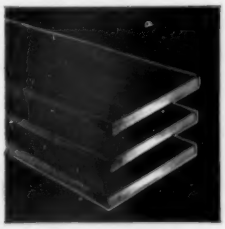
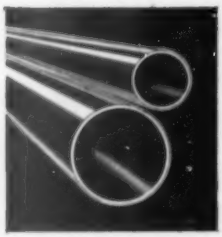


Stainless-Clad Steel Plates



Alloy and Carbon Steel Plates



Large Diameter Welded Steel Pipe

ABILENE • ALBUQUERQUE • AMARILLO • ATLANTA • BOISE • BOSTON • BUFFALO
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CLAYMONT STEEL PRODUCTS

PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CFI

1st COMMERCIAL WELL IN SOUTH DAKOTA

AXELSON RODS! AXELSON PUMP!

State "A" No. 1, first commercial discovery in South Dakota, is many miles across rugged country from the nearest supply house... even our own stores at Glendive in Montana, and Newcastle in Wyoming.

Such conditions magnify the importance of dependable pumping equipment. Logically enough, AXELSON was selected to produce State "A" No. 1. A tapered string of No. 59 rods activates a rod liner pump anchored below 8,700 feet.*

Any pumper, at any depth in any field, is a more satisfactory producer when AXELSON equipped. Ask any J&L man for specific recommendations.

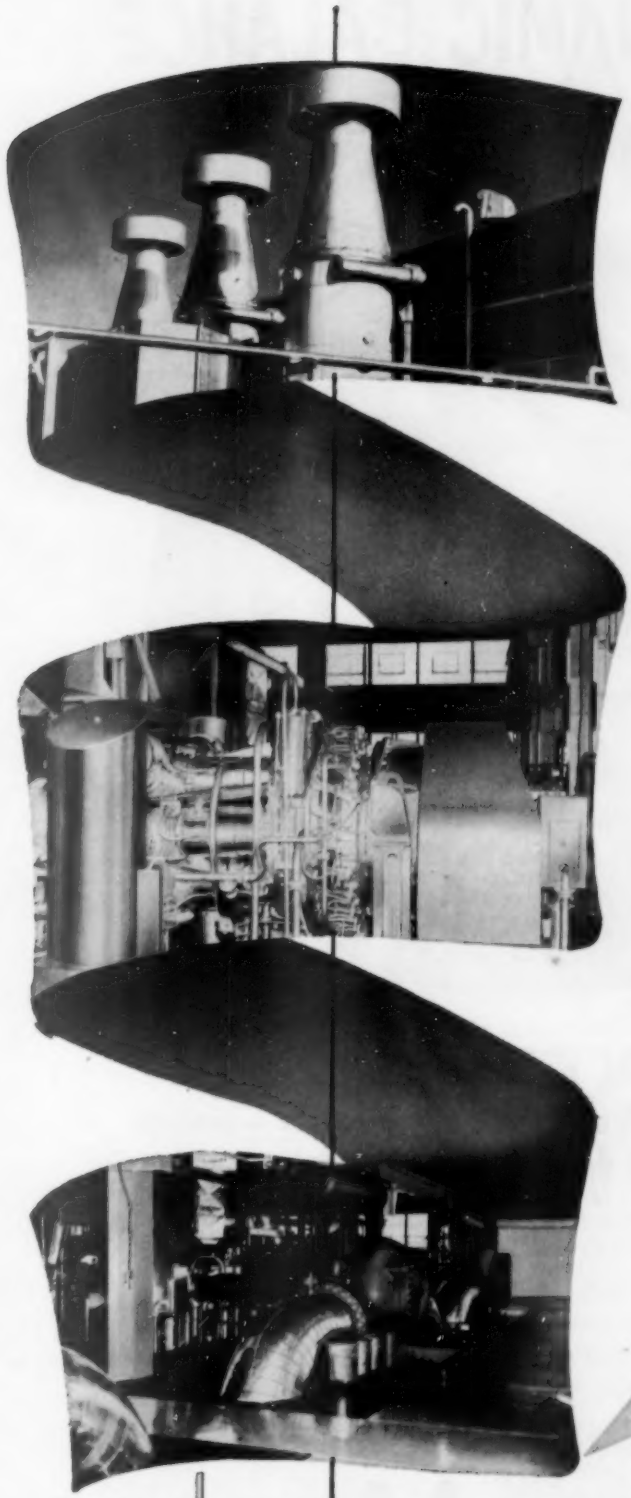
J&L STEEL

"...here's MY warehouse!"

Jones & Laughlin STEEL CORPORATION
SUPPLY DIVISION —— TULSA
Serving The United States and Canada

*AXELSON No. 59 Sucker Rods are made of nickel-molybdenum alloy steel, fully normalized and tempered from end to end before threading. Recommended for extra heavy loads. Strong, ductile, shock resistant.

*AXELSON Deep Well Plunger Pumps, rod liner type with stationary barrel, are ideal for deep wells where pump diameters must be reduced and rod stretch is unavoidable. Can be installed and removed without disturbing the tubing.



FLOW SHEET TO GAS FLOW IN LESS THAN 8 MONTHS!

Built by Pritchard means you go on stream . . . on schedule! The average time from flow sheet to gas flow for three major gas transmission stations recently completed by Pritchard was only seven months and one week.

Shown here is the Northern Natural Gas Company compressor station at Tescott, Kansas. A similar station was built at Macksville, Kansas, for the same company. Each is equipped with three gas turbine compressor units. Together they have a total of 34,200 horsepower and were built at a cost of less than $250 per horsepower!

This combined example is just one of many that proves Pritchard's complete package contract saves you time . . . and money! Every segment of the planning and installation of your gas facility is completed by Pritchard's skilled, experienced personnel on a carefully coordinated engineering, purchasing and construction schedule.

To get it right . . . and right on time . . . be sure *you* contact Pritchard for your next gas installation.

Industry's Partner for Progress

J. F. Pritchard & Co.

ENGINEERS • CONSTRUCTORS

Dept. 400, 210 West 10th Street, Kansas City 5, Mo.

CHICAGO • HOUSTON • NEW ORLEANS • NEW YORK
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SERVING THE GAS, POWER, PETROLEUM AND CHEMICAL INDUSTRIES

STATIC and DYNAMIC BALANCE

of BRODIE *BiRotor* METERS assures both initial and continued accuracy — smooth continuous delivery — longer continuous service

It's not only *initial* accuracy—but also *continued* accuracy that counts. You get both with Brodie *BiRotor* Meters—

- **plus less wear, maintenance and repair**
- **plus longer trouble-free operation and service life**

For fully balanced performance, specify Brodie *BiRotor* Meters—they're made accurate to stay accurate.

BRODIE BiRotor METERS

ALL-STEEL TRUE-ROTARY

RALPH N. BRODIE CO., INC. • ALVARADO & WEST 137th AVE., SAN LEANDRO, CALIFORNIA, U.S.A.

MT. VERNON, N. Y.	CHICAGO 5, ILL.	DALLAS, TEXAS	SEATTLE 9, WASH.	LOS ANGELES 22, CALIF.
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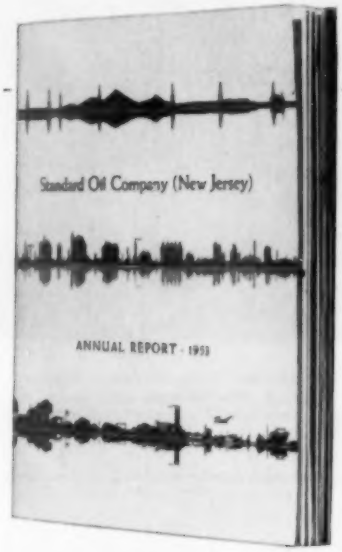
REPRESENTATIVES WITH STOCKS AND SERVICE FACILITIES IN ALL PRINCIPAL CITIES

A report that concerns everyone!



THE BUSINESS OF FINDING, refining and bringing to market the world's oil is a big and continuing job—one in which Standard Oil Company (New Jersey), among many others, plays a significant part.

How this job is done affects America in many ways—and is therefore important to every American. Our Annual Report for 1953, recently mailed to the 284,000 shareholders who own this company, tells about our part in this job, and some of its high lights may interest you.

* * *

Today, when many thoughtful people are wondering about the economic future, we're glad to say that things look good to us. As far as we can see from the evidence available, the economy of the free world is stronger now than at any time since World War II.

But more important than hopeful words are positive actions.

Since 1946 Standard Oil Company (New Jersey) and its affiliated companies have spent nearly 4 billion dollars on new facilities to help supply the oil needs of free people... a 4-billion-dollar vote of confidence in the future. This year we intend to invest even more than the 500 million dollars we spent last year.

The result? Continuously increasing reserves of oil in the ground. Modern equipment. More efficient operations. New and better products.

Our customers used more oil in 1953 than ever before, which meant that people lived better, that industry was more active, that the free world's economy prospered.

We took in more money, and paid out more wages and salaries to employees, more taxes to governments, more dividends to shareholders than in any previous year.

Esso research made great strides ...outstanding gasolines and lubricants were among the results of dynamic progress in this field.

* * *

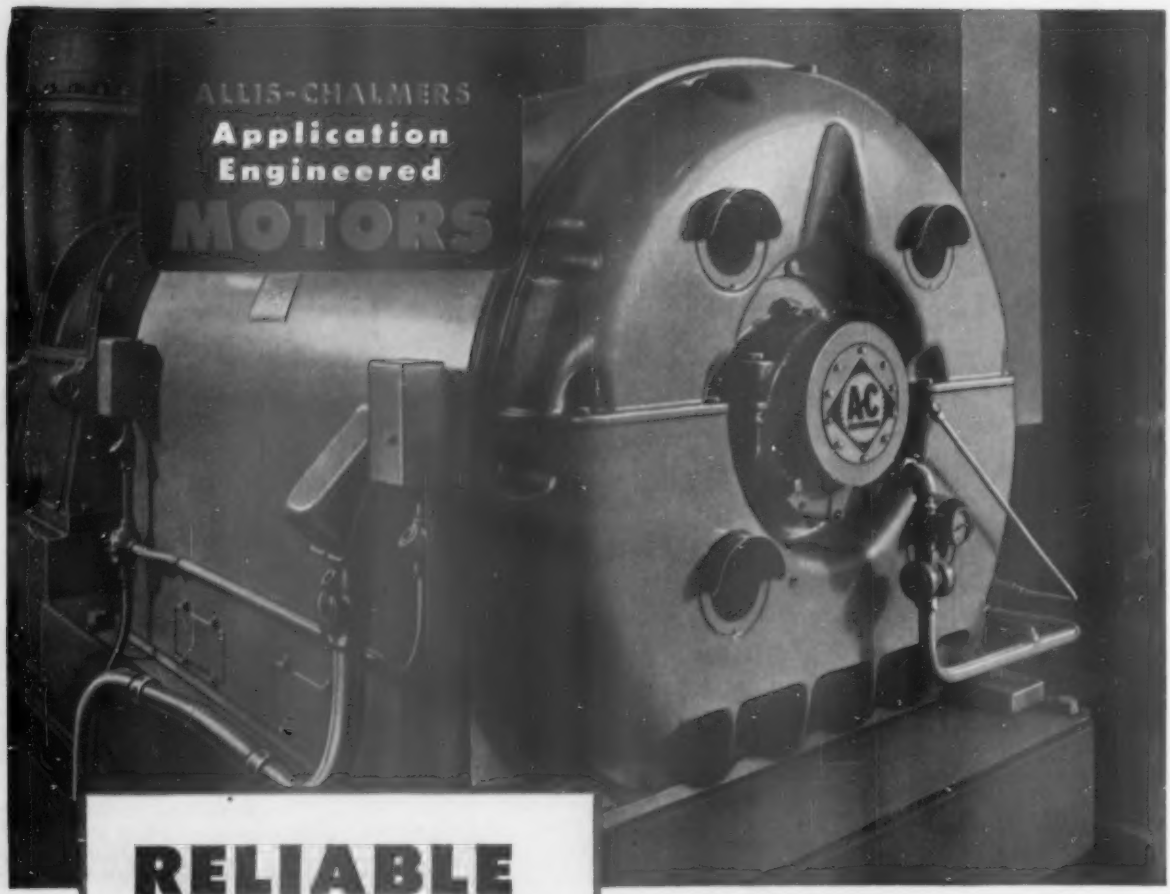
These activities—these investments made to get people the oil they need —are vital factors in our nation's economy, for they directly affect thousands of businesses and individuals. And everybody benefits.

This is a continuing process. It has been our job for 72 years. It will continue to be our job.

IF YOU'D BE INTERESTED in receiving a copy of our 1953 Annual Report, write Standard Oil Company (New Jersey), Room 1626, 30 Rockefeller Plaza, New York 20, N. Y.

STANDARD OIL COMPANY (NEW JERSEY)
and affiliated companies

ESSO



RELIABLE LOW-COST Air *for Fluid Catalytic Cracking Units*

Frontier Oil Refining Company uses a 3000-hp, 4160-volt, 1790-rpm Allis-Chalmers cage motor to drive an Allis-Chalmers 4-stage centrifugal main air blower at its Buffalo, New York, refinery.

Motor-driven installations have proved that modern electric power systems can provide the service reliability required for catalytic cracking blower and compressor drives. And they can do the job cheaper than steam turbine drives in most cases.

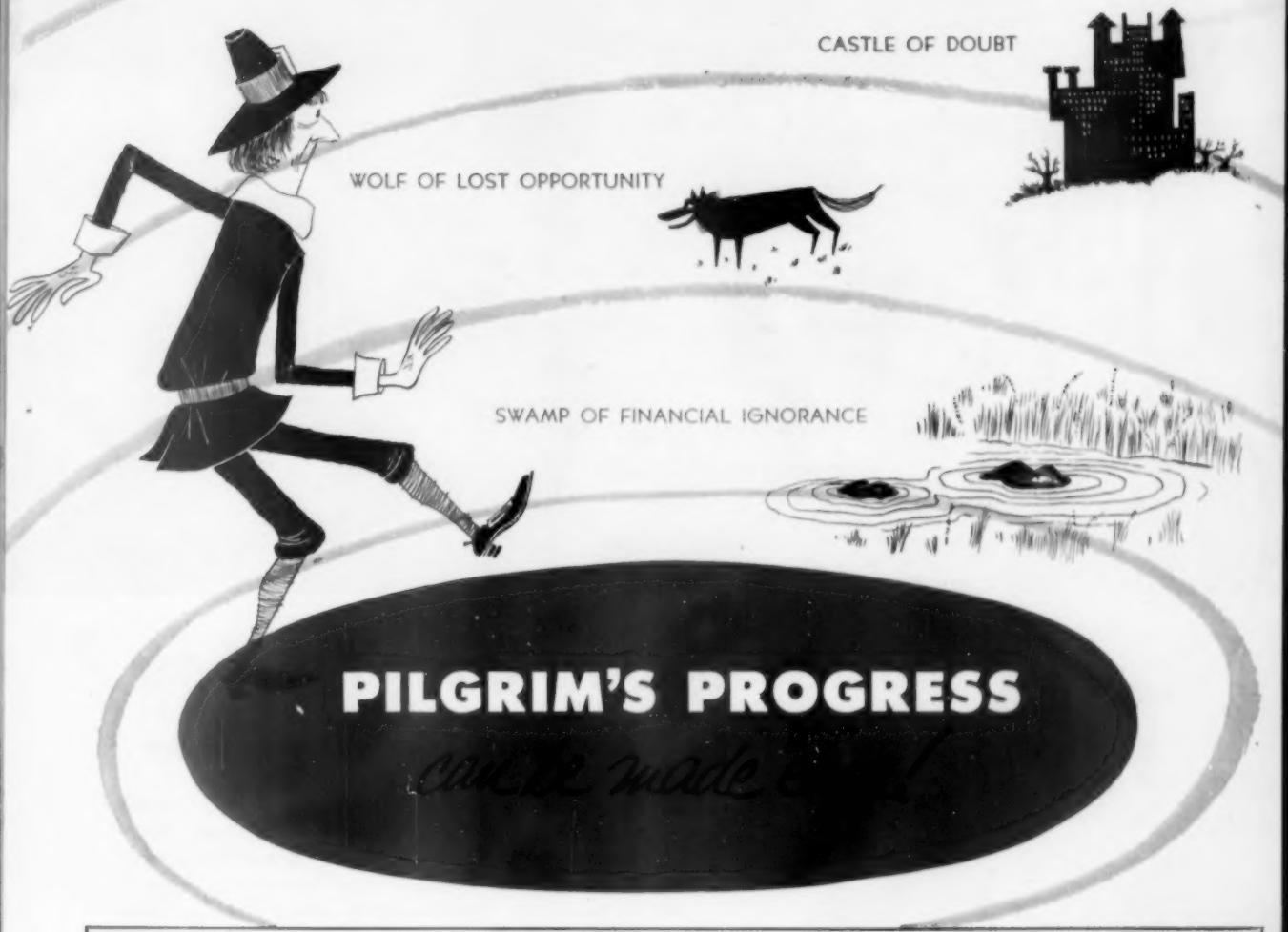
Initial investment savings of $500,000 have been reported. Maintenance costs are significantly lower. Relative operating costs, while determined by prevailing power rates and other factors, are often lower for electric drive installations.

Allis-Chalmers can supply synchronous or induction motors engineered to meet any FCCU requirements. Both types are available in drip-proof, splash-proof, pipe or forced-ventilated, totally-enclosed fan-cooled, and explosion-proof designs. All are built for maximum dependability plus ready accessibility for inspection and maintenance.

Your nearby A-C representative can help you determine the relative merits of steam and electric drives for specific applications. Allis-Chalmers, Milwaukee 1, Wis.

A-4295

ALLIS-CHALMERS



PILGRIM'S PROGRESS

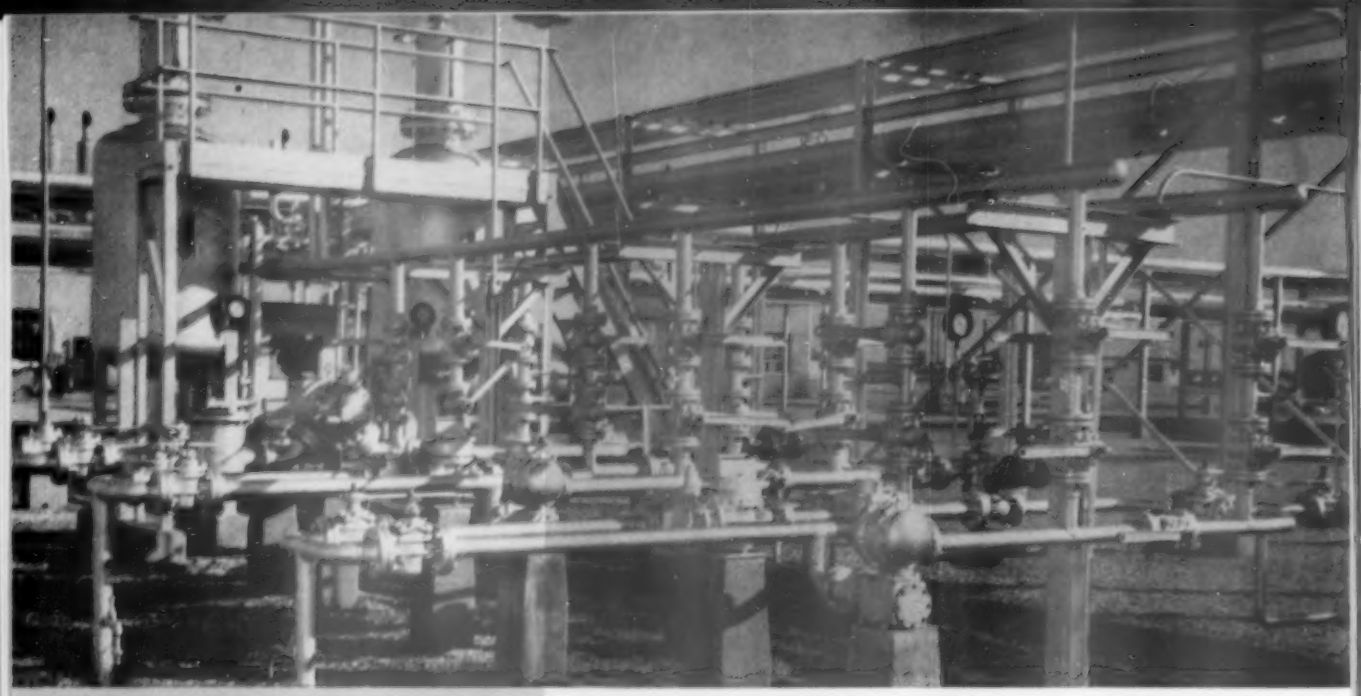
The progress of your business depends on your ability to plan ahead — to plan for future, orderly growth. The proved experience of officers of The National Bank of Commerce can help you in making these plans. And they can help you to keep your business running smoothly. The National Bank of Commerce has every modern banking facility available for its industrial depositors. You can put these complete services to work for you when you make The National Bank of Commerce of Houston your bank.

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



Examine the list of analyses. Then, before you choose your new piping or tubing, get in touch with our engineers. In that way, you'll be certain to get the right analysis for your particular requirements. Our recommendations are a service to you, putting you under no obligation.

National Tube's 25 different steel tube analyses:

Carbon	5 Cr, ½ Mo	18-8
Carbon, ½ Mo	5 Cr, ½ Mo, 1½ Si	18-8 Ti
½ Cr, ½ Mo	7 Cr, ½ Mo	18-8 Cb
1 Cr, ½ Mo	8 Cr, ½ Mo	18-8 Mo
1¼ Cr, ½ Mo	9 Cr, 1 Mo	25-20
2 Cr, ½ Mo	9 Cr, 1 Mo	3½ Ni
2¼ Cr, 1 Mo	12 Cr	5 Ni
2½ Cr, ½ Mo, ¼ Si	12 Cr, Al	
3 Cr, 1 Mo	17 Cr	

Refinery Tubing Problems?

We specialize in solving them

● Before you select refinery pipe and tubes, perhaps we can help you in the many problems you must face: basic differences in equipment, variations in fabricating operations, service pressure, high or low temperature conditions, presence of corrosive media, etc. Individually or collectively, all of these factors enter into determination of the best pipe or tube material for your particular service conditions.

You aren't expected to be a tubing expert—it isn't part of your job. It's ours. Our *specialty* is tubing. Through research and laboratory experimentation, through on-the-scene observations, and by studying actual installations, we at National Tube have built up an "experience file"—a collection of case histories that date back through 60 years of solving tubing problems. We want to share this experience with you.

To meet the increasingly more rigorous demands of refinery service, National Pipe and Tubes have been constantly improved until now we are able to offer you seamless tubing, condenser and heat exchanger tubes, and refinery piping in a wide range of analyses—25 of which are listed at the left. Each of these 25 analyses meets the specific requirements of corrosion and oxidation for which it is recommended. Other chemical compositions are also available in tubular products, and a wide variety of high temperature problems are now under study.

NATIONAL TUBE DIVISION,
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

WALLS WITHOUT WELDS

USS NATIONAL SEAMLESS PIPE AND TUBES

USS

UNITED STATES STEEL

Right where you want it

. . . salvaging oil from a slush pit
. . . removing water around storage tanks
. . . transferring oil from pipe line to tank truck
. . . dewatering around a drilling location
. . . in general utility service around pipe lines and refinery, the REX® Speed-Primer Self-Priming Pump outperforms all others.

Right When you want it!

. . . patented air peeler means pump is always in *prime* of life
. . . instant starting in cold and wet weather
. . . maximum capacities with mud and debris-filled water
. . . easy inspection and maintenance against time limits
. . . always a great performance on any job under toughest field conditions—*every time.*

Rex Speed-Primer Pumps

. . . just check these outstanding advantages:
*Simplest pump ever designed
*Most accessible
*Highly portable
*Simplest, most positive leakproof seal
*And most important—the Rex is the only pump with the patented adjustable air peeler that maintains new pump efficiency for the lifetime of the pump.

CHAIN BELT COMPANY

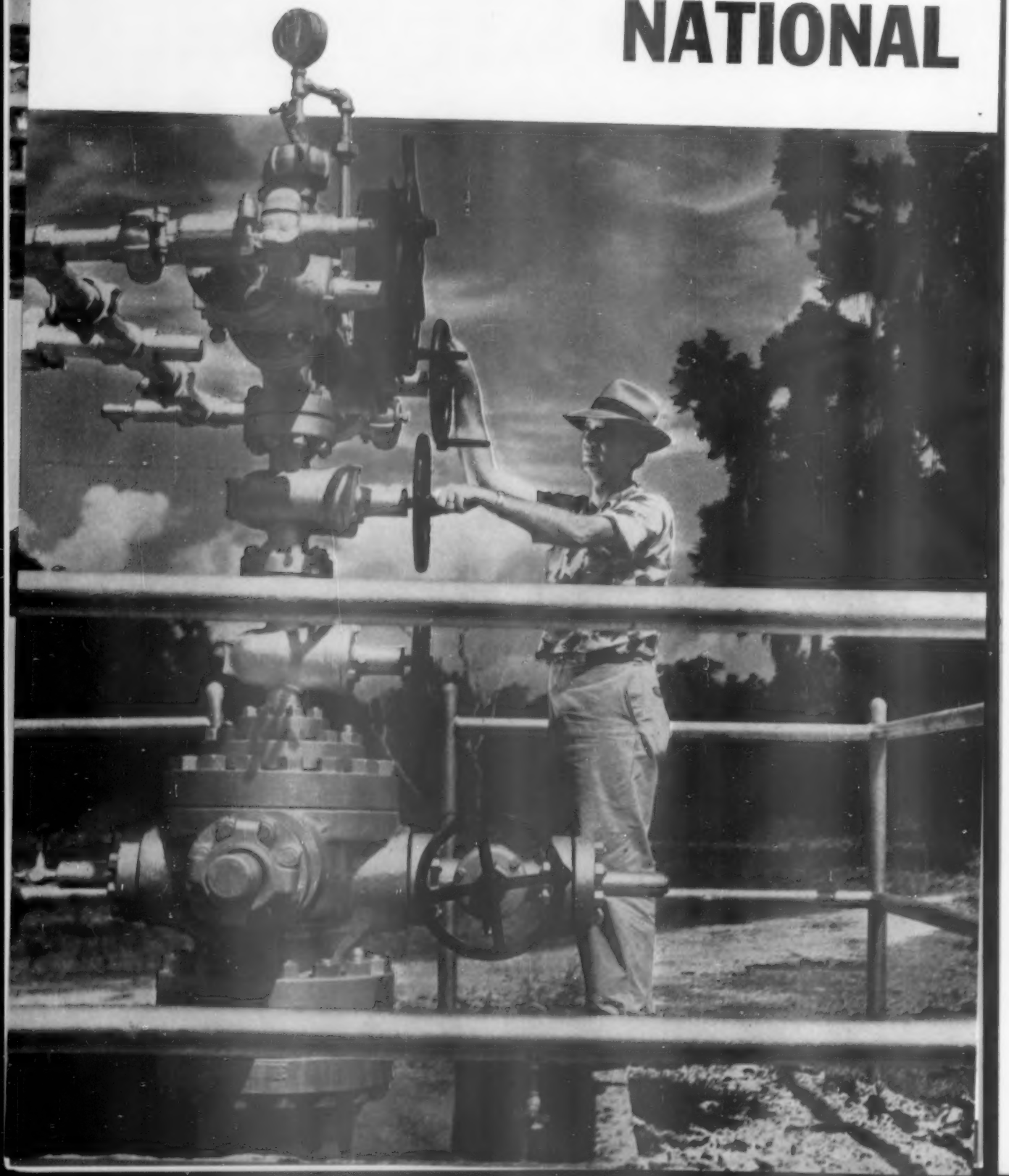
CHAIN BELT REX COMPANY®

4619 W. Greenfield Ave., Milwaukee 1, Wis.

Rex Oil Field Sales Offices Are Located in the Following Cities: New York • Tulsa • Dallas • Houston • Midland • Los Angeles

Designed for efficient production,

NATIONAL



tested for safe performance —

WELLHEAD EQUIPMENT

From the bonnet to the casing flange, every component part of National Wellhead Equipment is designed, built and tested for specific service application—to assure maximum performance with utmost safety. Like operators everywhere, you can specify this dependable National Wellhead Equipment with the assurance that you will get:

Maximum Flexibility—interchangeable units afford a multitude of combinations to meet your specific requirements in size, capacity and type.

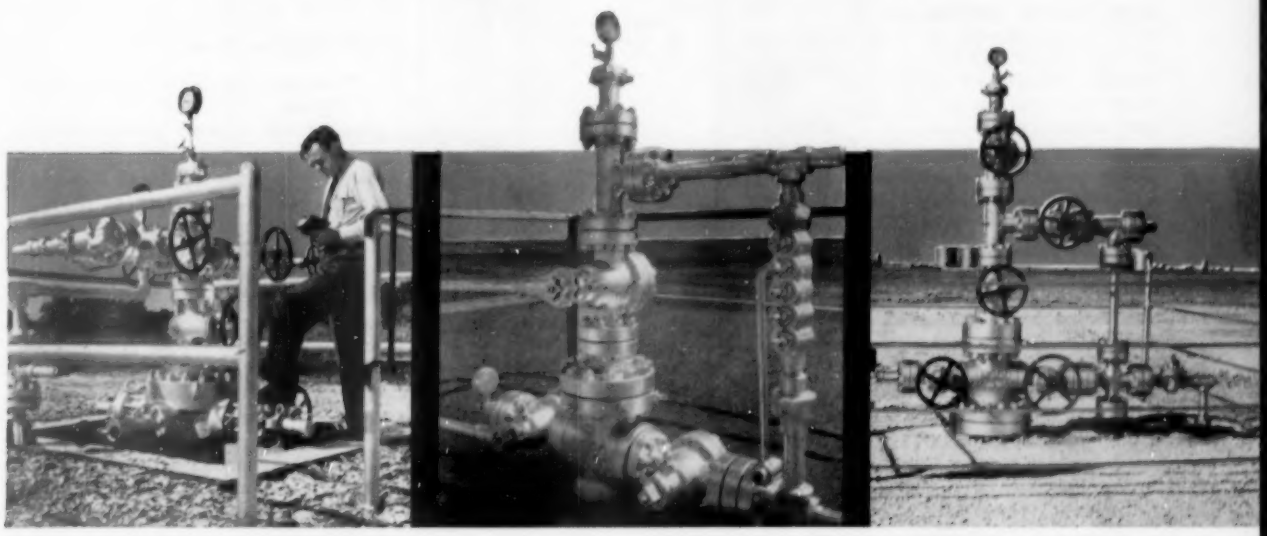
Ease of Assembly—parts are self-locating and self-activating, no special tools needed for installation.

Pre-tested Safety—National's triple-sealed Pressure Pack design insures trouble free performance and longer service life. Intensive testing procedures include special methods more severe than those specified by API standards.

You can find National Wellhead Equipment readily available in the stocks at National Supply Stores throughout the United States and Canada—where you'll also find a National equipment specialist ready for consultation on your wellhead problems. Why not talk over your requirements with him now?

... there's a National Wellhead for production at any depth or working pressure!

National Supply's Houston plant and National Supply Stores everywhere can meet your wellhead needs with a wide variety of tubing hangers, bonnets, valves, flanged and threaded fittings, adjustable chokes and flow beans, flow assemblies, and all types of specialty items for the completion of wells or the servicing of wellhead assemblies.



THE NATIONAL SUPPLY COMPANY

NATIONAL BLUE PRODUCTS

PITTSBURGH 30, PENNSYLVANIA

First in quality . . . First in supply service . . . in oil country everywhere

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

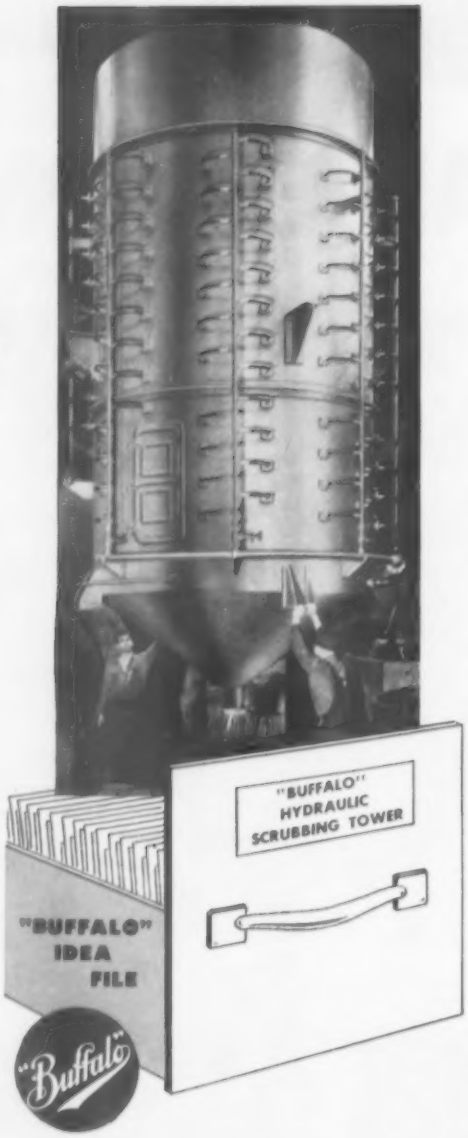
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C.2

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

"Buffalo" Hydraulic Scrubbing Tower Cleans Air

BETTER



PROBLEMS:

Cleaning discharges of hot, corrosive gases, heavy and erosive dusts, or linty, stringy materials. Ordinary equipment becomes plugged in a short time.

SOLUTION:

Wet centrifugal cleaning by the new "Buffalo" Hydraulic Scrubbing Tower solves above problems industry-wide. System of properly spaced Fog-type Nozzles creates a fog which jets air or gas thru unit, overcoming its own resistance. Each fog layer condenses the one below, permitting gravity travel of trapped material. This centrifugal spray action, plus scrubbing against a wetted surface, results in extremely high collection efficiency. Clogging, abrasion, corrosion and heat damage are overcome. The Scrubbing Tower is a compact, easily installed and maintained unit now handling many of the most difficult and specialized air cleaning jobs efficiently and at minimum cost.

BULLETIN AP-525 gives further details and applications on these units. Write for your copy today!

Call on "Buffalo" Know-How Backed By Thousands of Case Histories in our files from 77 years of building air handling equipment and solving air problems. Also, factory- and field-trained "Buffalo" Engineering Sales Representatives in principal cities are ready to help you.

BUFFALO FORGE COMPANY

525 Broadway Buffalo, N. Y.

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

They Say—

I.P.A.A.'s Biggest Service

"One of the most important, perhaps the most important single accomplishment of this association, has been its singular contribution toward a better relationship between the oil producer and his banker. There was a time when a producer who found a field, sold out and quit, or went on to look for other fields.

"Today, because of his financial acceptance, he stays to develop, and becomes a permanent entity in the industry and in his community. Through its continuous emphasis of a price concept which took into consideration the long-range cost of replacing extracted oil; through its advocacy of fair provisions of tax law; through its efforts in behalf of conservation, and through its attempt to see that the domestic oil producer maintained a fair share of the market for crude oil, the I.P.A.A. has played a substantial part in making oil in the ground a bankable proposition. . ."

Russell B. Brown, general counsel for Independent Petroleum Association of America, during an I.P.A.A. meeting in Denver.

From Short to Long

"With regard to oil production, western Canada in the past few years has gone through a phase that is common to most areas throughout the world when oil in large quantities is discovered: namely, from a shortage of crude to an over-abundant supply. . . .

"At the present time your company's wells could easily, I believe, produce as much as 100 per cent in excess of their allowables. Despite this condition, production by your company increased about 39 per cent, and it is anticipated that, in 1954, the production will show a further increase over 1953."

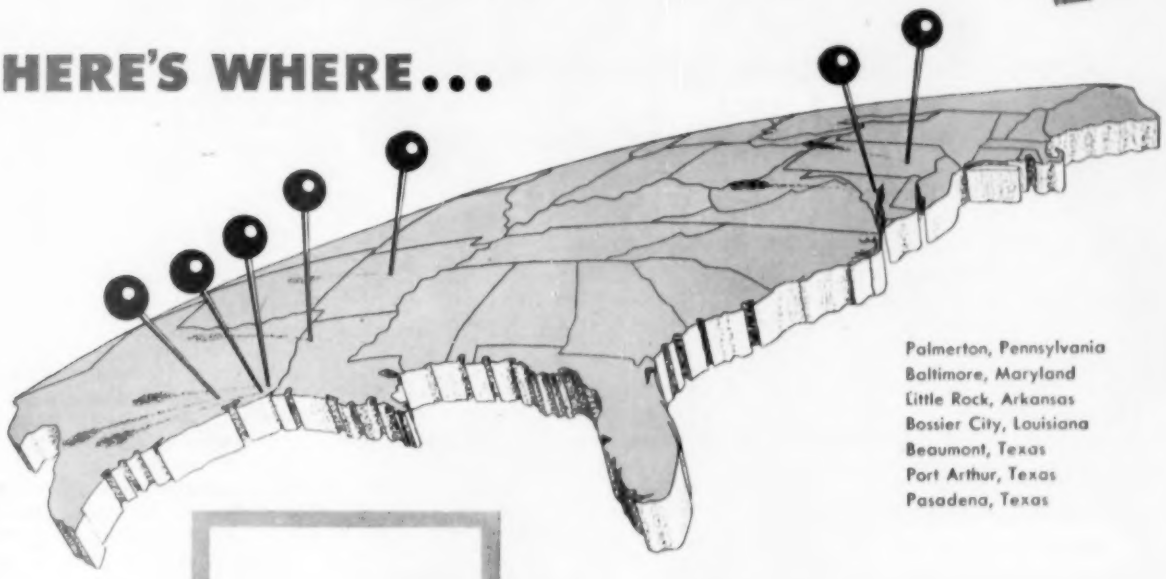
O. I. Torkelson, exploration and production vice president of British American Oil Co., Ltd., at a shareholders meeting.

Added Demand Seen

"Although our total crude production in the first quarter was somewhat lower than in the same period last year, we believe that during the whole year of 1954 we will produce more crude than we did in 1953. Domestic production is expected to increase in the sec-

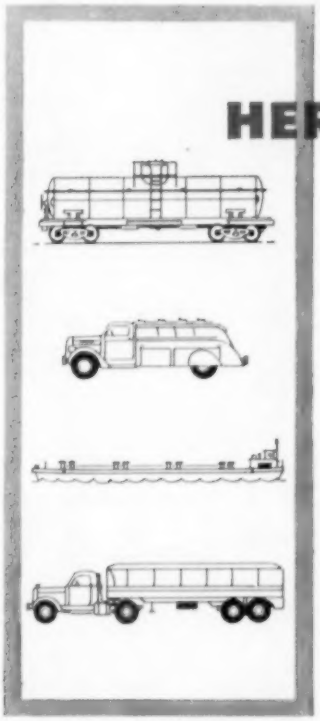
MATHIESON SULPHURIC ACID plus

HERE'S WHERE...



Palmerton, Pennsylvania
Baltimore, Maryland
Little Rock, Arkansas
Bossier City, Louisiana
Beaumont, Texas
Port Arthur, Texas
Pasadena, Texas

HERE'S HOW...



Transportation techniques, from plants and key shipping points, to fit your requirements. Tank car deliveries available from the seven shipping points listed above, with tank trucks, tank barges and tank transports available in certain areas.

HERE'S WHY...

Quality chemicals, PLUS dependable delivery schedules, PLUS flexibility in handling spent acid problems, add up to why you can buy to better advantage from Mathieson.

MATHIESON CHEMICAL CORPORATION
Mathieson Industrial Chemicals Division
Baltimore 3, Maryland

MATHIESON

CAUSTIC SODA • SODA ASH • CHLORINE • SULPHUR • SULPHURIC ACID • BICARBONATE OF SODA
SODIUM NITRATE • NITRIC ACID • SODIUM METHYLATE • AMMONIA • HYPOCHLORITE PRODUCTS
DRY ICE AND CARBONIC GAS • ETHYLENE GLYCOLS AND OXIDE • METHANOL • SODIUM CHLORITE

2255

HENRY H. PARIS DISTRIBUTOR Inc
Manufacturer's Agent - Oil Well and Refinery Supplies
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HOUSTON, TEXAS

Agent and Distributor for the following Nationally Known Manufacturers:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Pumping Units, Jacks & Surface Equipment

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC Valves, Bronze, Iron, Cast and Forged Steel for all purposes.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

STEEL FORGINGS, Inc.
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Weld Saddles.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

VOLCANO BURNER COMPANY
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Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

LOS ANGELES BOILER WORKS
Los Angeles, California
Welding Caps—Dished & Flanged Heads.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

ond half under more favorable allowables. In Venezuela, where we had experienced a natural decline in production after hitting a high point in 1950, we are now experiencing an upward trend.

". . . We firmly believe that the oil industry will continue to be a growth industry and that your company will share in that growth. Our present reading of the trend outlook indicates that U. S. demand for petroleum products 5 years from now is likely to be about 20 per cent above the current level, and that 10 years from now it may be about 35 per cent higher than it is today. . . ."

Henderson Supplee, Jr., president of Atlantic Refining Co., in an address at the annual stockholders meeting.

A Banker's Backing

". . . Many present-day producers are now selling oil, which they found 10 to 20 years ago and which was found at a cost which would not replace the oil today when you consider that field and wildcat wells drilled in 1953 in the United States totaled approximately 48,000. . . . Of that number more than one in three was dry and of the wildcat wells drilled about 9 out of every 10 were dry. To be exact, of the 47,740 wells drilled last year 29,291 of them or 61.3 per cent produced and 18,449 of them or 38.6 per cent were dry.

"The hazard percentage against success is apparent. The preservation of the 27½ per cent depletion is definitely indicated."

B. F. Barnett, president of Citizens National Bank, Tyler, in an address before a symposium on deep lime oil fields of East Texas sponsored by the Texas Petroleum and Research Committee.

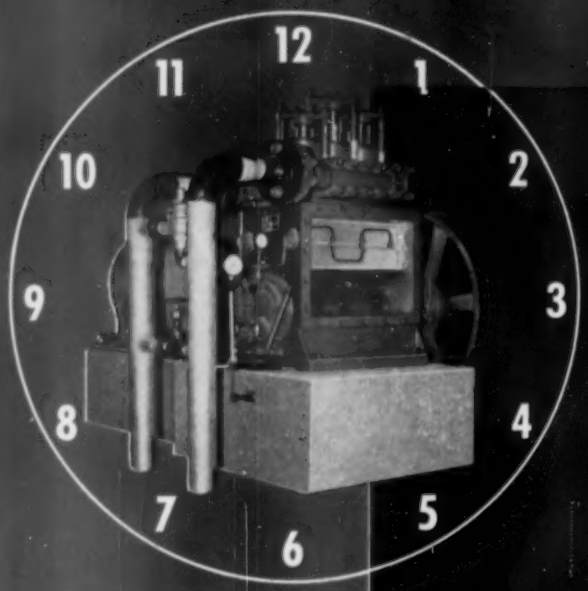
Advertising Adversary

"It is our opinion that a good deal of the recent gasoline advertising has been unsound and confusing to the public and that it will create only temporary benefits for the advertisers."

Samual H. Elliott, vice president in charge of sales for Standard Oil Co. (Ohio), at the company's annual meeting.

Gasoline Supply Solution

". . . At the end of March, the industry's gasoline inventories exceeded 180 million barrels and were some 20 million barrels or 12 per cent above the levels of a year ago. The demand for gasoline during the first quarter of



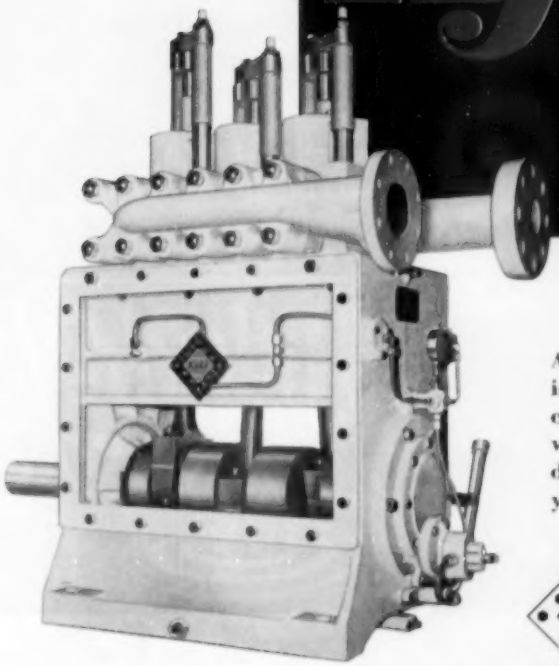
For CONSTANT PRESSURE

"Round the Clock"

INSTALL AN

Ajax PUMP

TP-4000 SERIES



IN YOUR RECOVERY OPERATION

Ability to maintain pressure in water-flooding is vital to efficient oil recovery at minimum costs. You get this dependable performance with the Ajax TP-4000 Pump because it is designed and built with your needs as the yardstick—by the makers of Ajax Engines with a worldwide reputation for reliability. ● Get the Ajax Pump facts—and you'll buy an Ajax Pump! *Write us for descriptive Bulletin 531 - - - see your Supply Man!*

AJAX

PESA

AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

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Smooth...
SMOOTHNESS in a rig means fast, trouble-free operation.
• Drum, large diameter, extra long.
• AIR-O-MATIC friction transmission and drum clutches
• Easy operating, finger tip controls.
• Built in Hydromatic brake with friction engaging clutch.
• Direct mechanical, fluid coupling or torque converter drive, optional.
• Six rotating and hoisting speeds.
These features make UNIT RIG'S Model U-40 a SMOOTH, fast operating, trouble free rig. The U-40 is designed to drill economically from 6,000 to 10,000 feet and is highly portable.
Buy a SMOOTH rig.
Buy a UNIT U-40.
U-40
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TULSA, OKLAHOMA U.S.A.
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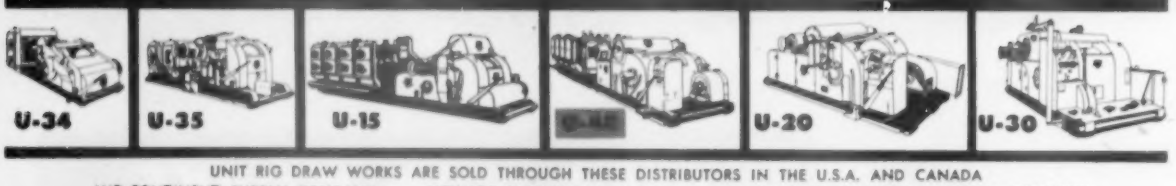

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1954 is estimated to have been only 3 per cent about the corresponding period of 1953. If refinery runs are maintained at levels of around 6.8 million barrels daily, the overaccumulation of gasoline inventories can be readily worked off during the summer months. Any increases in runs from this figure would contribute to the overaccumulation of gasoline."

L. F. McCollum, president of Continental Oil Co., in a statement to stockholders.

Here's the Market

"If all the registered motor vehicles in the United States were lined up bumper to bumper . . . the line would stretch from New York to San Francisco about 70 times.

"The distance traveled by motor vehicles over our highway system last year is equivalent to approximately 1,087,866 roundtrips to the moon—not one way, mind you, but up there and back. . ."

Lloyd F. Thanhouser, vice president and general counsel of Continental Oil Co., in an address before a meeting of the Marketing Division of the American Petroleum Institute.

Sun and Sarnia

"We have no doubts about the future progress of Canada. We have unbounded confidence that the petroleum needs of the dominion will continue to grow at a rapid rate. . . .

". . . . We shall make every effort to keep in tune with the spirit and aspirations of the Canadian people. We have made the Sarnia undertaking, as far as possible, an all-Canadian venture."

J. N. Pew, Jr., president of Sun Oil Co., Ltd., writing in Our Sun in connection with the opening of the Sarnia refinery.

TIPRO Backs FPC

"We concur in the FPC expression that the public interest will be served better through well-head prices more nearly approximating competitive market value of this product.

"An unmistakable danger is . . . gas production has increased at a faster rate than proved reserves since 1945. Under current prices paid at the well in Texas, it is uneconomic to search for natural gas, and we rely for most of our discoveries on the coincidence of gas in areas where we drill for oil. This has made for a glut in past years before gas began to supply more than one-fifth of our total energy consumption, and has brought about the present well-head price level so low as to deny full operation of the forces which can replenish the supply through new discoveries.

"It would be extremely unwise to do anything which would advance federal price controls over gas at the well—a regulatory function rightfully reserved to the state conservation authorities. . ."

Jack Woodard, president of Texas Independent Producers & Royalty Owners Association, in a letter to Sen. William A. Purtel, chairman of the Senate's subcommittee on business and consumer interest of the Interstate and Foreign Commerce Committee.

CALENDAR OF EVENTS

MAY

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

2-4 Southern Gas Association, short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex.

3-4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

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Super Champion
SNATCH BLOCK
Always the Best
★ Patented opening feature permits easy insertion of line while block is suspended.
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★ Impossible for ropes to jam.
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ACROSS THE PANHANDLES of Texas and Oklahoma this Cleveland Model 320 Trencher turned out high daily trench production under varying digging conditions between Dumas, Texas and Knowles, Oklahoma.

This "320" is one of twelve Cleveland Trenchers purchased by R. H. Fulton & Company of Lubbock, Texas. One of the nation's outstanding pipeline construction firms, Fulton & Company have standardized on Clevelands ever since the beginning of their operations.

"We use Clevelands almost exclusively," say Fulton & Company, "for the simple reason that they are the most economical trenchers we have ever used."

Write for descriptive literature and specifications or get the full story on CLEVELANDS from your local distributor.

THE CLEVELAND TRENCHER CO.

"Pioneer of the Modern Trencher"

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6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.

14-17 Twenty-sixth annual confrence and exhibit, Oil and Gas Division of the American Society of Mechanical Engineers, Hotel Muehlebach, Kansas City.

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

17-19 National Oil Scouts and Landmen's Association, annual meeting, New Orleans.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

20 July 4 Seventh annual Conferences on Personnel Administration and Managerial Development, Industrial Relations Section of the California Institute of Technology, California Institute of Technology, Pasadena, Calif.

21-25 Gordon Research conferences, conference on petroleum, Colby Junior College, New London, N. H.

24-25 Western Petroleum Refiners Association, regional meeting, Leonard refineries auditorium, Alma, Mich.

27 July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.

JULY

13-14 Western Plant Maintenance Conference, Ambassador Hotel, Los Angeles.

15 Southern Gas Association, conference on radio communications for pipelines, Adolphus Hotel, Dallas.

16 Southern Gas Association, dispatchers' conference, Adolphus Hotel, Dallas.

29-31 Wyoming Geological Association, ninth annual field conference, Casper, Wyo.

AUGUST

13 Southern Gas Association, conferences on pipeline operations and pipeline engineering, Rice Hotel, Houston.

16-18 Society of Automotive Engineers, West Coast annual meeting, Statler Hotel, Los Angeles.

20 Southern Gas Association, conferences on natural-gas gathering and natural-gas processing, Captain Shreve Hotel, Shreveport.

23-25 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

26-28 (tentative) Intermountain Association of Petroleum Geologists, fifth annual field conference, beginning at Price, Utah.

SEPTEMBER

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

8-10 Pacific Coast Gas Association, sixty-first annual meeting, Vancouver Hotel, Vancouver, B. C.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

10 Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

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Dependable Service Since 1931

13-14 Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans.
15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.
16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.
23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.
27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.
27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.
28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.
30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.
4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.
4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.
6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.
7- 8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.
7-8 American Institute of Mining and Mettallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.
11-13 American Gas Association, annual convention, Atlantic City, N. J.
11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.
12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.
14-17 Permian Basin Oil Show, Odessa, Tex.
17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.
24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.
26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

NOVEMBER

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.
4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.
8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

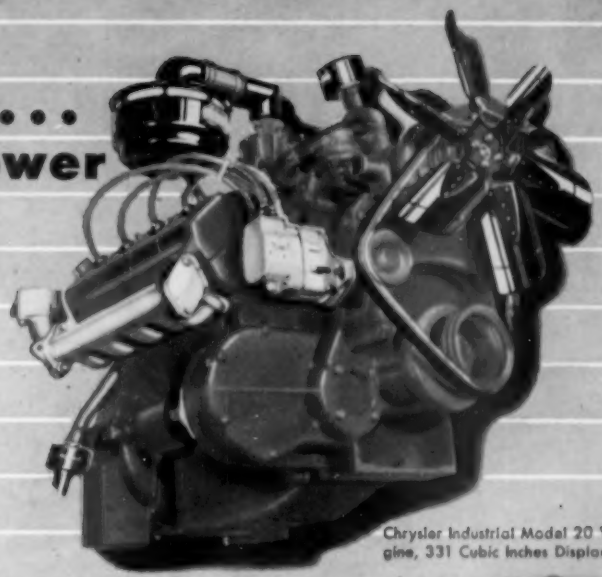
28-Dec.
3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.

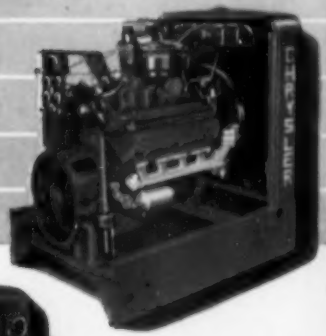
For greater PAY in your PAYloads... specify *CHRYSLER* power

Chrysler Industrial Model 16 Engine, 265 Cubic Inches Displacement.



Chrysler Industrial Model 20 V-8 Engine, 331 Cubic Inches Displacement.

Chrysler Open Power Units include the complete engine, skid base, radiator and grille, instruments and instrument panel, flywheel and flywheel housing. (Pictured is V-8 Open Power Unit, which also includes a twenty-five gallon fuel tank.)



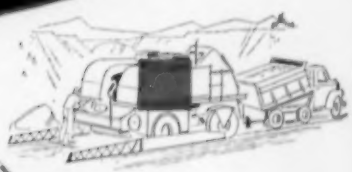
Chrysler Enclosed Power Units have the complete engine, instruments, instrument panel, skid base, fuel tank, radiator and grille, as well as fully enclosing sheet metal—side panels and hood top panel.

There are ten Chrysler Industrial Engines and Power Units, from 217 cubic inches to 413 cubic inches displacement. All of them operate with gasoline, natural gas or L-P gas fuels.

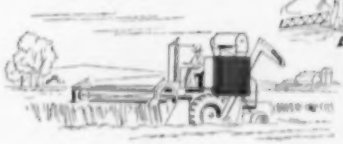
True to the Chrysler tradition, these engines, both In-line 6 and V-8, are among the most advanced design, best engineered and most powerful engines available today in their power ranges. Yet, thanks to famed Chrysler Research, they are constructed of lightweight, highly alloyed steels and allow amazing horsepower to weight ratios.

They are, therefore, ideal engines for most any equipment, regardless of size or silhouette. Let our nearest dealer give you more details, you'll be agreeably surprised to know how inexpensive Chrysler Power—*equipped to meet your specifications*—is . . . that's because Chrysler production facilities and manufacturing know-how allow us to custom-equip engines and make them available at mass-production prices.

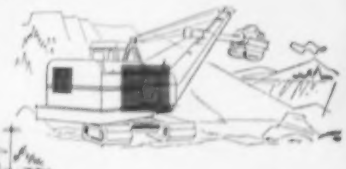
Install Chrysler with confidence. Our nationwide dealer organization assures you good service and fast parts availability. If you prefer, write us: ***Dept. 1451, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***



Street Paving Machine—powered with Chrysler Industrial Engine.



Farm Combine—powered with Chrysler Industrial Engine.



One-Half Yard Shovel—powered with Chrysler Industrial Engine.

Fork Truck—powered with Chrysler Industrial Engine.

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THE OIL AND GAS

JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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JOURNALLY Speaking

Correction

SOMEBODY'S always hauling us up short. This time it's a chemical engineer with Petroleos Mexicanos at Poza Rica. He detects a flaw in the piece we ran in this space a few weeks back explaining that automobile windshields were being shattered by the exhaust blasts of flying saucers that travel faster than the speed of light in order to escape detection. What's more, he backs it up with scientific data:

"I wonder if you are serious, but it is impossible for anything except light itself to travel with the speed of light. According to one of Einstein's equations:

$$m = \frac{m_o}{[1 - (v/c)^2]^{1/2}}$$

where:

m_o = mass of body at rest
m = mass of same body in motion
v = speed of body
c = speed of light

Therefore, if saucers travel with higher speed than light, m would be 'imaginary,' and that is nonsense."

Muy bien, Señor, so what we wrote was nonsense. Who are we to argue with Einstein? Guess we'll have to look for some other explanation for those shattered windshields.

High-Pressure Reporting

"GENERALLY Texas or California oil men are prone to claim the 'greatest,' but here's a claim from Michigan that should beat anything found anywhere else." So wrote a California reader who enclosed a clipping from a country weekly in Michigan telling about the completion of a new well in Washtenaw County which had "a pressure of nearly 5,500,000 pounds."

Because oil is new in this area, the paper obligingly explained to its readers that "the recorded pressure of 5,350,000 pounds indicates that the well is a pretty good one," because well pressures usually do not go above 8,000,000 pounds and a well with a pressure exceeding 2,000,000 pounds is generally considered valuable.

Additional information was that "more than 50 Texas and Oklahoma oil men are swarming over the ground," and that "oil trade papers in the Southwest are filled with stories of the new strike."

It looked as though we'd been scooped, for our own favorite oil publication hasn't been filled with stories about this strike. And a well with pressure like that certainly should attract a swarm of oil men—or at least designers of pressure-control equipment. Even the H-bomb experts ought to raise an eyebrow at a force of 5,000,000 psi.

But, confident that the Big Yellow Book seldom misses anything of importance in the oil industry, we combed its pages and finally found this well listed in the fine print in the back. Only it said that the well gaged 5,350,000 cu. ft. of natural gas per day on initial test. Just a little matter of confusing feet and pounds. Pretty fair gas well for Michigan, at that, but it doesn't have enough pressure to blow the whole state off the map, so relax.

Benny's Check

AT a convocation at the University of Oklahoma last week an interested spectator was Howard W. Benischeck, chairman of the petroleum engineering department of the College of Engineering. Suddenly "Benny" was called to the platform and handed a surprise check for $2,700.

Benny's check was from Socony-Vacuum Oil Co. in appreciation for the many research programs Benischeck has headed resulting in solutions to technical problems in oil production.

Just a little example of how oil companies depend on research, and of how they contribute heavily, and usually quietly, to education through scholarships, fellowships, endowments, and research grants.

—Henry D. Ralph.

here's the long

...and the short

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Baker Wire Line Bridge Plugs are...
LONG on DEPENDABILITY, PERFORMANCE and ECONOMY

Dependable *Baker Wire Line Setting Mechanism* . . . takes less time, *and* sets the plug exactly where you want it.

Reliable, Leak-Proof Pack-Off—Baker Bridge Plugs stay where they are set—no creep or crawl—and produce a pack-off that will withstand any pressure differential, from either above or below the plug, that is safe for the casing.

SHORT

Baker Wire Line Bridge Plugs are..
SHORT IN LENGTH and in DRILLING-OUT TIME.

The Most Drillable of All Bridge Plugs—The Baker Wire Line Bridge Plug is significantly SHORTER. And, the shorter the plug, the less material to drill up. In addition, the cross-sectional construction of the Baker Bridge Plug is designed to break up under bit action. That's why you are always far ahead in drilling-out time with the Baker Wire Line Bridge Plug.

Cast Iron or Magnesium Alloy—
Take your choice of Baker Wire Line Bridge Plugs made from Cast Iron or from Magnesium Alloy, whichever fits your particular requirements. Either one will hold any pressure differential from above or below the plug, that is safe for the casing itself.

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Time, Murchison, and the depletion allowance

TIME magazine last week offered another example of the snide propaganda campaign of the left-wing press against the oil industry in general and the depletion allowance in particular.

An article about Clinton W. Murchison and other "Texas oil millionaires" reflects an attitude of suspicion and derision toward any man who has been able to make some money. It implies that any contact with oil results in an easy fortune, cavalier living, and sinister operations. And it deliberately plants the impression that all this is due to the producers' 27½ per cent depletion allowance, "the tax bonanza enjoyed by all oil men."

With such sneeringly used phrases as "big rich", "ocean of oil", "block-long Cadillac", "pirate's treasure", and "depletion-fed" the article suggests that oil men misuse great wealth which they acquired pretty much as a gift from the taxpayers because of this horrible, unconscionable depletion allowance.

Clint Murchison doesn't need us to defend him and he probably doesn't give a damn what people say about him. Actually very little of his fortune came from oil production to which the depletion allowance, just or unjust, applies. He made most of his money by smart trading and long chances, taking advantage of capital-gains and any other tax provision which offered a fair return on investment.

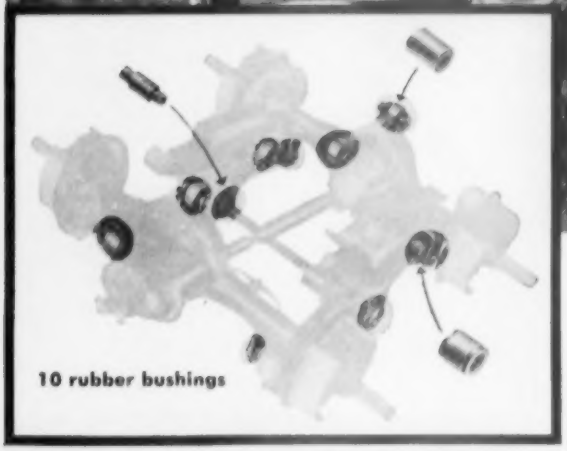
WHAT BURNS US UP, and what should be resented by everyone in the oil industry, is the insidious interlarding of references to the depletion allowance into an account of financial successes, personal idiosyncracies, and private philanthropies. What oil men or others choose to do with their earnings has no rational relationship to the source of income.

On its merits, the depletion allowance has withstood every frontal attack and is recognized as a proper incentive for investment in the development of a wasting asset. So now the jealous, the misinformed, and the detractors of private capital seem engaged in a campaign of subversion against it, employing sneers, ridicule, and invidious implication to picture the depletion allowance as the root of much actual or potential evil.

It's not the Murchisons and the "oil-rich Texans" who should defend the depletion allowance against such fifth-column tactics, but every person in the industry whose livelihood depends on maintaining a supply of oil at reasonable prices.

SO LONG AS ARTICLES like this one in Time go unchallenged and unrefuted, left-wing writers and politicians will find it popular and profitable to undermine the depletion allowance and any other means by which an investor has a chance of reaping a reward from a venture which develops resources and jobs and wealth for the nation.

CHAMPION
of the 6-wheel field



Most advanced bogie in the 6-wheel field—bar none! That's the word for the new INTERNATIONAL bogie, here shown on the famous INTERNATIONAL "twist course." It features (inset) exclusive new straddle-mounted torque arm design. New lubrication-eliminating, shock-reducing rubber bushings. New, easier-serviced, protected air brake cylinder unit. *Only INTERNATIONAL has it. Compare!*

INTERNATIONAL Trucks have been sales leader in the 6-wheel field for 19 straight years . . . because of such extra-efficiency features as the power divider and third differential . . . because of low operating and maintenance costs in both bogie and truck provided by traditional INTERNATIONAL quality and extra-tough, truck-engineered components.

Today, INTERNATIONAL 6-wheel trucks are still champions, with a *new* bogie design that provides unmatched ruggedness—further cuts costs—further lengthens axle and truck life.

INTERNATIONAL and only INTERNATIONAL gives you *all* these advanced bogie features, plus a range of models for every 6-wheel need. See your nearby Dealer or Branch for full facts and the complete INTERNATIONAL money-saving story. Time payments arranged.

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24 SIX-WHEEL MODELS
22,000 to 90,000 Pounds GVW

All heavy-duty engineered, with wheelbases, transmission and axle ratios for every need. Engines from 130 to 356 h.p. Choice of gasoline or LPG power. Diesel engines available in models with GVW ratings of 30,000 lbs. and over. A part of America's most complete truck line—175 basic models, from ½-ton pickups to 90,000 lbs. GVW off-highway models.

International Harvester Builds McCORMICK® Farm Equipment and FARMALL® Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL® TRUCKS
"Standard of the Highway"

THIS WEEK . . . . . IN THE NEWS

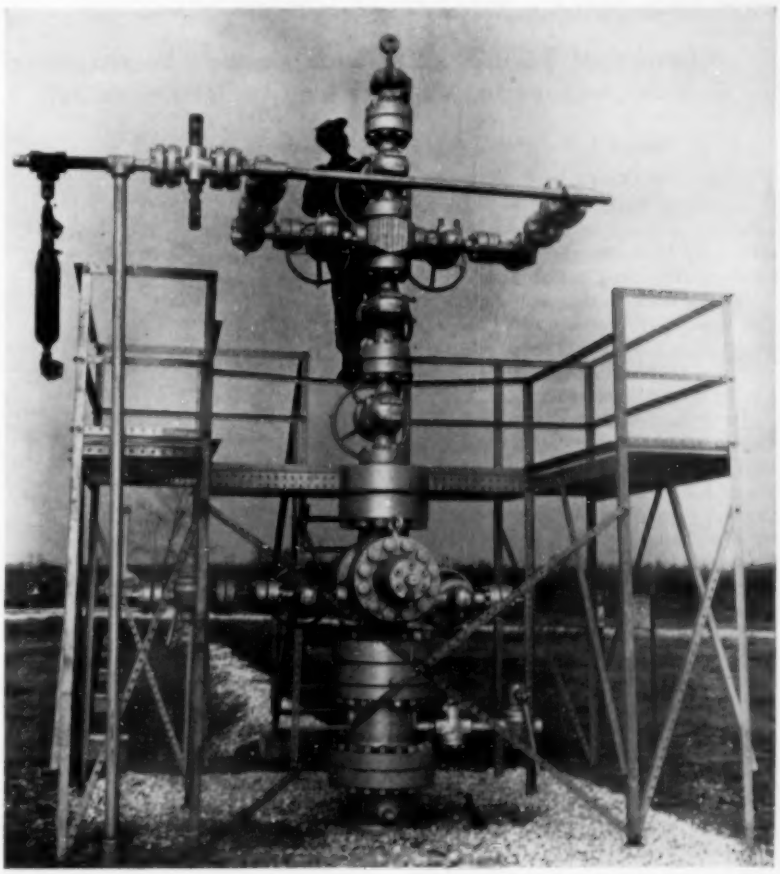
PIPELINE—North Dakota Gas Transmission will win permit to build 474-mile gas line from Tioga to Fargo and Grand Forks if 16 conditions laid down by Public Service Commission are met. . . . Modification of contract with Amerada among requirements. . . . Construction may start in August. . . . ¶Plans are developing fast as Trans Canada steps up move to build world's largest line from Alberta to Ontario and Quebec. . . . Board of Transport Commission will hear proposal about June 15. . . . Approval of $300,000,000 project expected. . . . ¶Construction of Fosterton-Regina 16-in. crude line scheduled to start early in July. . . . Announcement follows recent temporary abandonment of Sioux Pipeline System. . . .

INTERNATIONAL — Anglo - Iranian discloses its refining capacity will reach 600,000 bbl. daily when current construction in Aden and Australia is completed. . . . Figure is 40,000 bbl. below company's capacity before loss of 500,000-bbl. Abadan refinery. . . . ¶Creole's Proudfit says 1954 will be substantially the same as 1953 in spite of lower consumption of heavy fuel in the United States. . . . ¶Expansion program makes Esso's Hamburg-Harburg refinery the largest in western Europe. . . .

EXPLORATION — Monterey spuds first of three tests from newly constructed drilling island of Seal Beach. . . . The first well will be a vertical test of shallow sands. . . . ¶Ohio cements casing at 17,233 ft. in Paloma field test and prepares to test prospective sand in world's deepest well. . . . Company apparently has abandoned hope of bringing in world's deepest producer. . . . ¶Shell bottoms possible Nevada discovery at 10,358 ft. and plans to try and bring in state's first producer from a saturated zone at about 6,400 ft. . . . ¶Magnolia finds 800 ft. of pay in Eugene Island test, 30 miles off coast of St. Mary Parish, Louisiana. . . . ¶Phillips Petroleum has new San Juan basin gas discovery in Rio Arriba County, New Mexico. . . .

GOVERNMENT—Senate approves plan for Navy to charter tankers on long-term basis. . . . Legislation will permit Navy to charter 20 "super" tankers on 10-year basis at cost not exceeding $5 per ton per month. . . . House now must act on measure. . . .

DRILLING—New techniques—using engine-exhaust gas instead of drilling mud—increases penetration rates in hard formations of Northwest Arkansas. . . . Operators feel it may point way to lowering extremely high costs of conventional drilling in hard rock. . . . ¶West Coast firm uses truck-mounted miniature rig to drill 3,000-ft., 2¾-in. holes with 1¼-in. tubing. . . . Firm officials say costs amount to only $2.84 per foot. . . .



THIS 18-FT. HIGH christmas tree on British-American Oil Producing Co.-Placid Oil Co.'s 1 Kidder Barry 6 miles northeast of Lafayette, La., dwarfs a workman as he makes an adjustment. The $17,000 installation is needed to control the tremendous pressures encountered in the Barry sand at 10,400 ft. in Anse La Butte field. Bottom-hole pressure is 7,145 psi.—about 50 per cent higher than normal at this depth.

PETROCHEMICALS—Allied Chemical & Dye announces plans to expand Orange, Tex., plant at the same time it is dedicated. . . . New plant produces ethylene glycols and ethylene oxide and plans call for expansion to produce ethanolamines. . . . Continental Blacks, Inc., dedicates its new $2,750,000 oil-black plant at Ponca City, Okla. . . . New plant features high degree of instrumentation, high recovery of carbon content of oil feed, and 100 per cent efficiency in collection. . . .

SECONDARY RECOVERY—Texas Railroad Commission gives go-ahead to plans for unit operation of Pegasus field, one of world's biggest water floods. . . . Project expected to recover more than 140,000,000 bbl. of additional oil. . . . ¶Plans for unitizing and water flooding Fault Block "A" in Oklahoma's Sholem Alechem field disclosed. . . . Project would be one of most profitable ever attempted. . . . Engineers estimate it will recover 10 times as much oil as is expected in the future from primary means. . . .

Longest Line Nearer

Approval of $300,000,000 Trans Canada line expected in June; engineering contract may be let before July 1

Robert J. Enright

DALLAS.—Trans Canada Pipe Lines' drive to build the world's largest pipeline, a huge natural-gas carrier stretching from Alberta to Ontario and Quebec, is gaining momentum.

Developments are expected thick and fast now that the company has been granted its long-sought-after permit to export gas from Alberta by the provincial government.

The federal Board of Transport Commissioners is slated to begin hearings on the Trans Canada proposal about June 15. These hearings, according to Frank Schultz, vice president of the firm in Dallas, should take no longer than a week, and it is considered certain that the board will approve the project.

The board also is expected to endorse some form of government financial aid, such as reduced taxes or waiver of duties, to help the line over the first few lean years of operation.

It probably will clear up, too, the question of whether Trans Canada will be permitted to build a projected lateral branching off the main line at Winnipeg, Man., to serve the St. Paul-Minneapolis area of the United States.

Soon after the hearing before the transport board, and before the first of July, Trans Canada expects to let the engineering contract for the big line.

Gas source . . . Under the permit issued by Alberta, Trans Canada will be allowed to export a maximum of 4.35 trillion cubic feet of gas from the province over a 25-year period beginning by the end of 1955. This averages out to about 470,000,000 cu. ft. daily aver the 25 years.

The company would be permitted to export no more than 540,000,000 cu. ft. a day and no more than 183 billion cubic feet in any one year.

Gas was allocated to the line from 13 large fields in the province. As was expected, the big Pincher Creek gas field will supply considerable gas for the line—almost 1.4 trillion cubic feet over the 25-year period.

During the first calendar year, 6.9 billion cubic feet will be exported from Princess, Medicine Hat, and Cessford fields. All of these pools lie near the western terminus of the main line, which has been moved east from Princess, Alta., about 80 miles west of the Saskatchewan border, to within a mile of the border.

During the second calendar year, the line will be permitted to take 56.3 billion cubic feet from the previously mentioned fields plus Pincher Creek, Provost, Nevis, Homeglen Rimbey, Dutchess, Countess, Sibbald, Oyen, Hamilton Lake, and Kessler.

The exportable volume during the third calendar year will be boosted to 137.9 billion from the same fields.

During the remainder of the 25 years, Trans Canada will be permitted to take from these fields the following volumes of gas in billions of cubic feet: Pincher Creek, 1,311.9; Medicine Hat, 215.3; Cessford, 777.7; Princess, 149.2; Provost, 394.7; Nevis, 320.4; Homeglen Rimbey, 517.8; Dutchess, 10.5; Countess, 48.4; Sibbald, 24.7; Oyen, 14.8; Hamilton Lake, 33; and Kessler, 24.7.

Another 191.8 billion cubic feet was allocated the line from a large number of smaller fields. The province will reserve an additional 113 billion for the line before December 31, 1955, to fill out the total to 4.35 trillion cubic feet.

Gathering system . . . Combined cost of the main transmission system and of the gathering system will be about $300,000,000, Schultz said. The gathering system, alone, will cost in the neighborhood of $27,000,000. Many more millions of dollars will be spent for connecting distribution systems on the eastern end of the line and for gas-processing plants in the fields.

Construction and operation of the Alberta gathering system will be under the direction of a provincially controlled, but not owned, company. The producers supplying the gas, Schultz said, will hold most of the stock in the company. Trans Canada, he said, will own about 5 per cent of the gathering system, and utilities another 5 per cent.

The provincial government will have one director on the board, which will be composed entirely of Albertans.

This plan for operation of the gathering system for the Trans Canada project is virtually assured of Alberta approval, Schultz said. It has the firm backing of Premier E. C. Manning. Manning has insisted on provincial participation in the company, primarily as assurance against future extension of

Helicopters Tested for Field Use on Natural-Gas Pipeline

Colorado Interstate Gas Co. is considering the use of helicopters to transport chart changers to and from widely scattered gas wells in Oklahoma and Kansas. The company is now evaluating data compiled after a 15-day trial period of the "egg beaters." The copter shown here at the company's Lakin, Kans., compressor station hauled personnel to and from more than 200 wells. The trial run was made on a contract with Allied Helicopter Co., Tulsa.

federal regulation to the gas fields, as is now threatened in the United States.

Branch line . . . If the transport board approves the controversial branch line to the Minneapolis-St. Paul area in the United States, the lateral stands a good chance of being built, Schultz said.

Trans Canada's next move, provided the transport board approves the lateral, would be to apply to the Federal Power Commission for permission to build and operate the line and to export the gas. Schultz said the company contemplates no opposition before FPC except the usual amount from the coal bloc. He predicted that the commission would give the project its blessing in the "usual 6 to 8 months."

Financing of the big line will not be pushed actively, Schultz said, until after the hearing before the transport board.

Swamp Ownership Decided

WINNIPEG, Man. — Ownership of swamp lands is vested in the Province of Manitoba, the Supreme Court of Canada ruled in a case involving title to 1,400,000 acres.

Oil men consider two areas of the land significant. One is a 40-acre tract in Daly field near Virden and the other a large parcel in the Oak Lake vicinity about 20 miles east of the Virden-Roselea field. The Daly tract is surrounded by producers and the Oak Lake area is considered a possible extension of the Roselea trend.

The suit was brought by the Canadian Superior Oil Co., which held an oil and gas lease on the Daly field tract. It was granted by William Heibert, owner of the surface rights who contended he also owned the minerals under Manitoba's real property act. The court upheld contention of the province that the Provincial Lands Act of 1913 vested mineral ownership in the province.

The California-Standard Co.'s reservation from Manitoba covers both the Daly field and Oak Lake tracts.

Manitoba Activity Resumed

WINNIPEG, Man.—Oil activity has been resumed with lifting of load limits on roads in the rural municipalities of Wallace and Pipestone.

The two municipalities (counties) lifted the bans after a conference during which municipal, provincial and oil company officials promised to work out a formula of rural road aid *(The Oil and Gas Journal, May 17, page 82)*.

Ninety per cent of Manitoba exploration and development is in Wallace and Pipestone.

Pembina Field Defined

Officially it's small, but the industry's eyes are on six Imperial wildcats that may greatly expand producing area

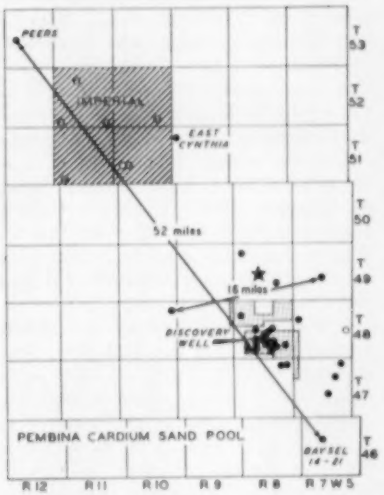
CALGARY.—Pembina field was officially defined last week by the Petroleum and Natural Gas Conservation Board.

The boundaries, however, outline an area much too modest to suit most geologists.

The field as defined by the board (lower shaded area) comprises less than a township, which contains 29¾ sq. miles, and contains 15 completed wells.

In the entire Cardium sand trend generally considered to constitute Pembina field, however, there are 29 completed wells and about 50 active operations.

The critical area in determining the field's size is the block held by Imperial Oil, Ltd. (upper shaded area on map). Six wildcats are currently under way here in the Imperial block and on these tests ride the hopes of Pembina operators for a producing area of tremendous size.



What's involved . . . A distance of 52 miles now separates Shell Oil Co.'s Peers Cardium discovery and the Baysel et al. 14-21. Three companies now seeking pipeline permits in the field have submitted reserves estimates varying from 762,000,000 to 952,960,000,000 bbl.

Pembina field was opened June 17, 1953, by Socony-Vacuum Oil Co.'s 1 Pembina (arrow on map). Stanolind Oil & Gas Co. recently gave a boost to interest in the field's potentialities with two Cardium discoveries on the western margin of the field.

The Cardium, a new producing horizon for Canada, is Cretaceous in age and is found at 5,200 ft. The official field area is 62 miles west-southwest of Edmonton and 150 miles north-northwest of Calgary. Despite the rough country in this area of Alberta, development and exploratory activity continued at a high rate through the winter and spring months.

New activity . . . Socony-Vacuum Exploration Co., as operator with the Seaboard Oil Co. team in a large-scale Pembina project, will drill an evaluation wildcat in North Pembina. This test will be 1¾ miles northwest of the Socony-Seaboard 13-11, the North Pembina Cardium discovery, and 3 miles southeast of the 30-15 Cardium oil well (star on map).

Seaboard will drill three new tests in the general Pembina area. Two will be located on a 12-section spread owned jointly by Seaboard and associates.

These wildcats will search primarily for Cardium sand production, but will go on down to the Viking sand if the Cardium should be found dry.

Line Programed

Work on Fosterton-Regina pipeline to start in July

REGINA. — Construction of a 155-mile, 16-in. crude-oil pipeline from the Fosterton area of west-central Saskatchewan to Regina is scheduled to begin early in July, Resources Minister J. H. Brockelbank has announced.

The line, which will have a capacity of 20,000 bbl. daily, will be built by Socony-Vacuum Exploration Co., Woodley Canadian Oils, Ltd., and Southern Production Co., Inc. It will be the first leg of the journey for Fosterton-area crude bound for the Great Northern Oil Co. refinery now under construction at St. Paul, Minn. The latter company is controlled by Woodley and Southern Production.

The Socony-Vacuum-Southern team drilled the discovery well in Fosterton field late in 1952. With the subsequent discovery of the Cantuar and Success fields and the North Premier and Southeast Midway pools, the team has established reserves in excess of 75,000,000 bbl. of 21° to 24° crude. There are 133 wells capable of production in

the area. A further development program is under way.

In announcing the construction, Brockelbank said the group hopes to begin work by July 1, and complete the job by the following June.

It was announced in March that Great Northern was to start construction on its 20,000-bbl. a day refinery and that the company was committed to Fosterton crude. Plans outlined at that time called for construction of the Fosterton-Regina line. At Regina it is proposed to move the crude via the Interprovincial pipeline to a take-off point at either Clear Brook, Minn., or Superior, Wis. It will be moved from one of these two points to St. Paul via a pipeline to be constructed by Great Northern *(See The Oil and Gas Journal, May 17, page 83).*

Socony-Vacuum farmed the crown acreage containing the Fosterton, Success, and Cantuar fields and other pools mentioned, from the team of Woodley and Southern Production. Socony, as operator, has earned a 50 per cent interest in the acreage and production. Woodley holds a 30 per cent interest and Southern Production, 20 per cent.

Announcement of firm plans for the Fosterton line followed the recent announcement that a proposal for a big-inch crude-oil line from Montana to the Great Lakes area had been dropped as not economically feasible at the present time. This system had been given serious consideration by 12 companies operating in the Williston basin *(The Oil and Gas Journal, May 17, page 83).*

Gas-Cap Use Approved

REGINA.—The withdrawal of up to 30,000,000 cu. ft. a day of natural gas from the Coleville-Smiley gas cap has been authorized by Resources Minister J. H. Brockelbank.

The announcement followed a public hearing before the Oil and Gas Conservation Board here at which oil companies asked that gas withdrawals from the field be limited to a maximum of 10,000,000 cu. ft. a day.

The conservation point before the hearing was whether the Coleville gas is associated with light-gravity oil found in the Viking sand zone in Smiley field.

All companies agreed that withdrawal of gas from the Coleville gas cap would have an adverse effect on the production of oil in Smiley field. They said, however, that in view of the needs of the Saskatchewan Power Corp. for gas for its Saskatoon pipeline, they felt that controlled withdrawal of up to 10,000,000 cu. ft. a day could be made without too harmful an effect on the field.

ECONOMICS

Imports Fall Sharply

Decline of crude, products in April tops seasonal drop in resid fuel; daily figure dips 51,300 bbl. below estimates

IMPORTS of crude and products decreased more than expected in April. The drop exceeded an anticipated seasonal decline in receipts of residual fuel.

Complete import data for April will not be available until about the middle of June, but importing company reports to the Texas Railroad Commission indicate a sharp drop in April.

However, part of the April reduction may have been due to shifts in shipping schedules that delayed some of the receipts until May.

In April, importers told the commission that they expected to bring in 924,100 bbl. daily during the month. Revised figures for April, shown on the May reports, total 872,800 bbl. daily for a drop of 51,300 bbl. daily.

May imports were estimated at 949,200 bbl. daily on the April reports, but were raised to 973,800 bbl. daily on the reports to the commission in May. This increase of 24,600 offset a little less than half of the April reduction.

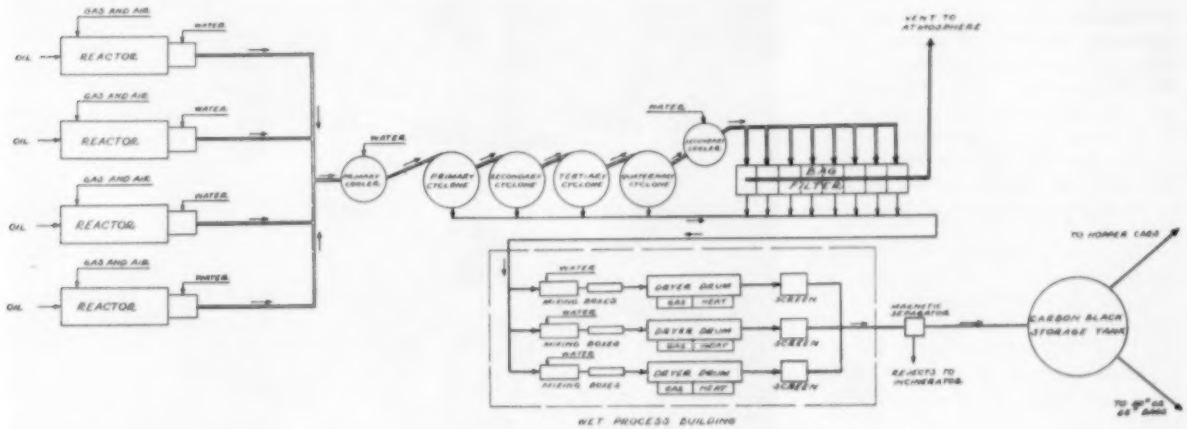
Estimates for the 5-month period, April through August, averaged 941,600 bbl. daily on the April reports. By the time the May reports were filed with the commission, estimates for the 5-month period had been reduced to 934,300 bbl. daily, a cut of 7,300 bbl. daily.

IMPORTS*

(Thousands of barrels daily)

	Actual		Estimated or forecast				
	April 1953	April 1954	May 1954	June 1954	July 1954	Aug. 1954	Sept. 1954
CRUDE—EAST COAST:							
Socony-Vacuum Oil Co.	105.3	89.0	89.0	89.0	89.0	89.0	89.0
Atlantic Refining Co.	55.7	60.2	65.8	65.8	65.8	65.8	65.8
Cities Service Co.	3.5	7.0	13.1	16.6	9.7	18.1	18.6
Eastern States Pet. Co.	6.7	4.3	4.3	3.5	3.5	3.5	3.5
Gulf Oil Corp.	89.0	93.0	142.0	120.0	126.0	125.0	130.0
McBride Oil and Gas Corp.				3.3	6.5	6.5	6.7
Phillips Petroleum Co.	6.7	6.6	6.4	6.7	6.4	6.4	6.7
Sinclair Oil Corp.	64.7	60.4	66.0	66.0	66.0	66.0	66.0
Socony-Vacuum Oil Co.	105.3	89.0	89.0	89.0	89.0	89.0	89.0
Standard Oil Co. of California	123.3	66.2	77.6	77.6	77.6	77.6	74.2
Standard Oil Co. (Ind.)	7.0	16.5	22.7	13.9	16.8	16.8	19.4
Standard Oil Co. (N.J.)†	77.0	85.0	80.0	80.0	81.0	81.0	81.0
Sun Oil Co.	7.7	7.6	14.5	7.5	7.3	11.3	7.5
The Texas Co.	60.7	46.1	55.6	54.5	53.0	53.0	50.3
Total East Coast	607.3	541.9	637.0	604.4	608.6	620.0	618.7
CRUDE—WEST COAST:							
Standard Oil Co. of California	‡	17.6	18.9	18.9	18.9	18.9	18.9
Tide Water Associated Oil Co.	‡	7.9	10.6	22.6	15.3	10.0	10.0
The Texas Co.	‡	4.4	21.2	10.2	17.4	20.0	20.0
Total West Coast	‡	29.9	50.7	51.7	51.6	48.9	48.9
Total United States	607.3	571.8	687.7	656.1	660.2	668.9	667.6
PRODUCTS:							
Asiatic Petroleum Corp.	5.7	1.1	7.9	9.0	7.7	7.5	10.0
Eastern States Pet. Co.	7.8	20.0	20.0	20.0	20.0	20.0	20.0
Gulf Oil Corp.	10.0	6.0	2.0	10.0	9.0	10.0	10.0
Shell Caribbean Pet. Co.§	104.0	72.0	80.0	80.0	70.0	60.0	90.0
Shell Oil Co.	10.9	25.7	19.5	19.0	15.0	15.0	15.6
Socony-Vacuum Oil Co.	6.9	10.4	6.5	6.5	6.8	6.8	6.8
Standard Oil Co. (Ind.)¶	31.0	13.4	20.2	3.4	23.3	11.6	12.0
Standard Oil Co. (N.J.)†	149.0	149.0	130.0	130.0	126.0	126.0	126.0
The Texas Co.	7.0	3.4		8.5	8.4	8.4	8.5
Total products	332.3	301.0	286.1	286.4	286.2	265.3	298.9
Total crude and products	939.6	872.8	973.8	942.5	946.4	934.2	966.5
Bonded fuel included‖	60.5	55.7	66.1	66.8	63.8	63.6	66.1

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Included with East Coast. §Imported by independent distributors. ¶Received through suppliers who can furnish either domestic or foreign oil. ‖Mostly duty free for bunkering ships in foreign trade.



Oil-Black Plant Opened

High recovery, 100 per cent collection efficiency, high degree of automation feature new Continental Blacks plant

John C. Reidel

PONCA CITY, Okla.—One of the most modern and efficient plants in the carbon-black industry was dedicated here last week. This is Continental Blacks, Inc.'s, new $2,750,000 oil-black plant with a capacity of 40,000,000 lb. per year of HAF and SAF blacks.

Outstanding plant features are the high degree of instrumentation employed, high recovery of the carbon content of the oil feed, and virtually 100 per cent collection efficiency made possible by the modern bag-filter unit. The plant is similar to that operated by Continental Oil Black Co. at Westlake, La., but improvements have been incorporated based on 3½ years of experience with the Westlake plant.

In addition to the Ponca City and Westlake installations, Continental Carbon Co. operates plants at Eunice, N. M., and Sunray, Tex. Ownership of the three affiliated companies is shared in varying percentages by Continental Oil Co., Witco Chemical Co., and Shamrock Oil & Gas Co. Robert I. Wishnick, of Witco Chemical, is president of the affiliated companies.

Production . . . Total capacity of these four plants at present is about 200,000,000 lb. per year, as compared with only 5,000,000 lb. per year when Witco-Continental first started carbon-black manufacture in 1920. Total industry capacity in 1920 was approximately 50,000,000 lb. annually.

For 1953 the Bureau of Mines reported total U. S. carbon-black production of over 1,600,000,000 lb. Equally significant with growth has been the marked shift from natural gas to liquid-hydrocarbon feed, with the latter accounting for more than 40 per cent of the total in 1953 *(The Oil and Gas Journal, May 24, page 121).*

Processing . . . This consists of carbon formation in the furnace-reactors followed by water quench. Next the black is collected in the multistage cyclone system, followed by further collection in the bag filter unit.

The last step is pelletizing of the black. Although only the wet process is shown in the simplified flow sheet, both wet and dry pelletizing will be employed at the Ponca City plant.

Feed to the plant is approximately 800 bbl. per day of residual oil from the nearby Continental refinery. This feed stock and some 1,500,000 cu. ft. per day of natural gas go to make between 120,000 and 140,000 lb. of black daily. The oil is cracked in refractory-lined furnaces at about 2,500° F. to form the carbon black.

The bag filter unit at Ponca City has over 4,000 Orlon filter bags, each 5 in. in diameter and 10 ft. long. An identical unit has been in operation at Continental Carbon Co.'s Sunray, Tex., plant.

Plant efficiency . . . Conversion and collection efficiencies have shown significant advancement. The old channel process recovered only 5 per cent of the carbon black. Gas furnace plants recovered about 30 per cent of the carbon black, with an over-all collection efficiency of some 90 per cent. In a modern oil-black plant such as that at Ponca City about 60 per cent of the carbon content of the oil is recovered and the collection efficiency is essentially 100 per cent.

Output Slashed

Oklahoma cuts allowable by 100,000 bbl. for June

OKLAHOMA CITY.—Crude-oil production in Oklahoma will be cut drastically as a result of the order of the Corporation Commission in setting June allowables at a rate which is expected to average about 430,000 bbl. per day.

Production during May has averaged about 530,000 bbl. per day.

The cut was accomplished by holding allocated fields, which produce around half of the state's oil, to 30 per cent of their August 1953 allowables. During May these fields operated at 50 per cent of August allowables and for several months previously the rate was 60 per cent.

Unallocated fields were cut to a maximum of 20 bbl. per day per well for June. The maximum was 25 bbl. per well in May and previously had been 30 bbl. per day.

This is the lowest per-well allowable in the history of the state. In allocated pools the June production is expected to average about 38 bbl. per well per day.

In general the reductions apply to unitized operations but not to water floods. As a temporary measure, the commission also denied permission to make up underages during June, and

severely restricted the bonus allowable given discovery wells during the testing period.

Nominations low . . . Purchasers first nominated 382,000 bbl. per day during June, but some of them later revised their figures to around 425,000 bbl. per day when it became apparent that there would be a state-wide cut. Thus, for the first time in more than a year, allowables in Oklahoma will be close to purchasers' estimates of market demand.

The two purchasers who invoked pipeline proration during May announced that they would take the full allowables from their connections during June. Rock Island Oil & Refining Co. had prorated by 15 per cent in May, and Sunray Oil Corp. by 30 per cent.

Producers at the allowables hearing protested the inequities caused by the severe cutback, but agreed to the June reduction "to test the market" for Oklahoma crude.

Price Peril Cited

United Gas president says gas price nears oil, coal

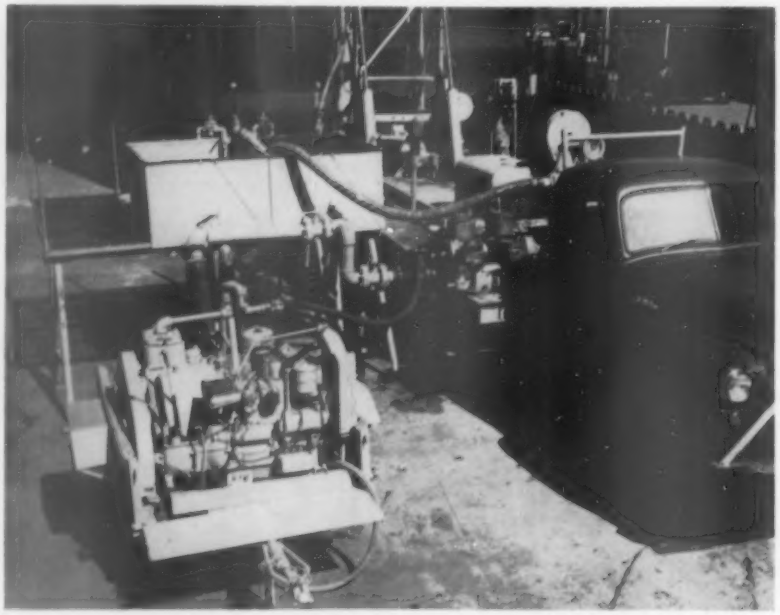
NEW YORK.—Rising prices of natural gas are bringing this fuel into direct price competition with oil and coal in many sections of the country, particularly the mid-Atlantic and Northeast states, N. C. McGowen, United Gas Corp. president, said here last week.

McGowen predicted that the higher prices for natural gas would cause it to seek selected or preferred markets where demand for gas is great and alternate fuels cannot readily be used. The rise in gas prices has been gradual, and as a result there is a possibility that gas may be pricing itself out of some markets.

Discussing his own company, the United Gas president said its construction program this year would amount to about $43,000,000. Of this, about $18,000,000 is budgeted for exploration and development, a similar sum for line improvements, and the remaining $7,000,000 for customer services.

In United's operation, cost of gas took 33 per cent of gross revenue for 1953, compared with only 14 per cent in 1946. At the same time, total expenses exclusive of the cost of gas dropped to 21.45 per cent of gross last year from 29.39 per cent in 1946. McGowen emphasized that the cost of gas is the largest single item in the company's operating expenses.

WEST COAST



New "micro rig" drills . . .

. . . Slimmer Holes Cheaper

D. H. Stormont

LOS ANGELES.—A truck-mounted "micro rig" capable of drilling a 2¾-in. hole with 1¼-in. tubing to a depth of 3,000 ft. at a cost of $2.84 per foot is being operated by a West Coast drilling firm.

The rig could be used for checking stratigraphic geology on deep objectives, its designers say, but so far it has been used for:

. . . Checking productive limits of known oil structures.

. . . Locating and testing fresh water strata for water wells.

. . . Exploratory drilling.

The rig and its operation were described by R. C. Berryman of Micro Drilling Co., Long Beach, at a dinner meeting of the A.I.M.E. Pacific Petroleum Chapter here last week.

Berryman based his cost figures on data obtained from drilling 8,900 ft. of "micro-hole" with the rig. The $2.84 per foot figure, he said, is based on a move of 100 miles each way and includes necessary time to rig up and dismantle. Total time would be about 14 days.

Cost of drilling surface hole, running and cementing 200 ft. of surface pipe, drilling at the rate of 14 ft. per hour with an average bit life of 235 ft., and time for logging and abandoning would be $2.17 per foot, Berryman said. Costs of bits, surface casing, and cementing, logging surface, survey rentals, mud and chemicals, and location cost would add another 67 cents a foot.

Equipment design . . . The 46-ft. truck-mounted derrick (capacity 40,000 lb.), trailer-mounted mud pumps, miniature mud system, and other necessary rotary equipment, cost about $50,000. Only about $3,000 is invested in the equipment below the rotary table when drilling at depths of about 3,000 ft.

The 1¼-in. upset tubing is used with conventional couplings. Tool joints would be too expensive. It is used with 2¾-in. bits to achieve a rising mud velocity of 180 ft. per minute. Because roller bits are not available in this size, drag-type bits with carboloy inserts on the cutting edges are used. Since diameter of the 200 ft. of drill collar and that of the couplings is 2¼ in., a very stable drilling string is realized, Berryman said.

From the standpoint of economy, Berryman cited the smaller drill site needed for the small-sized hole, a 10 to 1 cost reduction in mud and chemicals, and a significant saving by setting 3 and 4-in. surface pipe.

"Because of the small amounts of ce-

ment involved — usually less than 10 sacks—it's been our custom to cement the surface pipe with the rig pump instead of using cement trucks," he added.

The light loads involved permit hoisting requirements to be met with a 45-hp. gasoline engine. To gain smooth control, a torque converter is used in the transmission, driving both the draw works and the 6-in. oil-bath rotary. The draw works is a double drum type. Using one drum to hoist the kelly and the other for the drill pipe eliminates need for a rat hole.

Running pipe, slips are not used except when handling drill collars. Two elevators are used with two sets of lifting subs. To reduce trip time a breakout table is used in place of slips.

To protect against the rapid drop of fluid in the annulus with the withdrawal of the drill pipe, a valve to the kill line is installed on the derrick floor next to the bleeder valve. At all times during drilling, mud is either circulated through the drill pipe or through the kill line. To protect against blowouts, a 4-in. ram and master gate is screwed to the surface pipe. The hand-operated gates are of 10,000 psi. test.

Services used . . . Services used to date include electric logs, formation tests, directional surveys, and oriented punch cores. For the 300 ft. of hole cored with a 18-ft. conventional 1½-in. core barrel, there has been an average recovery of 80 per cent. At present such tools as dip-meters, side-wall samplers, and neutron and gamma ray logs are not available in this size hole, he declared.

Because of the tubing's small cross section, 16 twist-offs have been experienced, leading Berryman to recommend a 4-in. hole for depths beyond 4,000 ft. All fishing jobs to date resulted in recovery of the drill string except in one case. Because of the 2¼-in. joints in a 2¾-in. hole, all fishing had to be conducted with spears or similar tools.

Island Test Begun

Monterey starts first of three Seal Beach wildcats

LONG BEACH.—Monterey Oil Co. has spudded the first test it will drill from the $1,000,000 land-filled island constructed 1½ miles offshore from Seal Beach.

The wildcat, the first of three holes to be drilled, is scheduled to drill to basement. The venture is a joint operation with The Texas Co., which holds a one-half interest in the 1,400-acre state-granted lease. The drilling island is 75 ft. in diameter.

Construction on the island was undertaken in mid-1952 but was suspended for more than a year by a City of Seal Beach suit. The city claimed companies were violating a city antidrilling statute. Work was resumed last November when the state Supreme Court ruled against this claim.

This first well will be a vertical test of shallow sands which could not be penetrated on-structure by a wildcat slanted about 8,100 ft. from an upland well site. The slant-well was successfully completed in 1948 and currently is producing about 30 bbl. daily. Bottom of this approximately 12,500-ft. hole is a few hundred feet shoreward from the island.

Ohio Begins Testing

Casing run to 17,233 ft. in record-depth Paloma test

BAKERSFIELD, Calif. — Ohio Oil Co., holder of the world's drilling-depth record, apparently has given up the hope of establishing the world's deepest production in its Paloma field wildcat.

The company last week cemented 5½-in. casing at 17,233 ft. and prepared to begin testing a prospective oil sand encountered above 17,130 ft.

Ohio drilled the test to a total depth of 21,482 ft. before a twistoff occurred late last year. May 31 marks the 952nd day since the well was spudded in and 214th since the mammoth fishing job began.

Stuck drill pipe had been recovered to 17,237 ft. before casing was run on May 25.

If the zone to be tested should prove commercial production, the wildcat still would not set a producing-depth record. Richfield Oil Co. has gas-condensate production from 17,892 ft. in Kern County's North Coles Levee field.

Another deep wildcat which could develop the world's second deepest production continued testing last week. It is Humble Oil & Refining Co.'s 1 Rita Provost Minivielle, on the northeast flank of Louisiana's Weeks Island salt dome, which was drilled to 17,643 ft. *(The Oil and Gas Journal, May 24, page 124).*

Shell to Test Nevada Well

ELY, Nev.—Shell Oil Co. last week bottomed its possible Nevada discovery well near here at 10,358 ft., and prepared to plug back and test.

The company planned to run casing and attempt to bring the well in from a saturated zone at about 6,400 ft.

If the well should prove commercial, it would be Nevada's first oil well. The company late in February cored 350 ft. of oil section in the test, recovering 26°-gravity crude similar to Uinta basin crude in character.

Industry Briefs

AUSTIN.—The University of Texas will conduct an "Institute for Advanced Engineering" consisting of 3-week summer courses for briefing practicing engineers on recent advances in engineering. The first of these courses, August 26 through September 15, will cover "Composition and Properties of Oil Well Drilling Fluids." Fee for the course will be $125 and prerequisites for enrollment in the 50-man class are a B.S. in engineering or a B.A. in chemistry, geology or other acceptable science curriculum.

SANTA FE.—The state land agency in New Mexico announced last week that its May sale of oil and gas leases on state lands netted the state $907,265. Highest per-acre price was paid by Cabot Carbon Co.—$218.75 per acre for a 160-acre tract near Monument. Joe G. Sauer, Midland, Tex., made the largest individual offer—$185,000 for 1,040 acres near Maljamar.

WINDOW ROCK, Ariz. — More than $1,600,000 was paid into the Indian Bureau here May 22 for oil and gas leases on Navajo lands scattered through New Mexico, Arizona, and Utah. Shell Oil Co. offered the highest per-acre price for a lease on a single tract, paying in $91.11 per acre for a 2,560-acre block in San Juan County, New Mexico. Total bid was $233,241.60.

AUSTIN. — Texas collected $10,905,213 from its crude-oil gross-production tax in April, topping the state's take during March by more than $1,300,000. Collections from the gross production tax on natural and casinghead gas, which vary with the seasonal demand for gas, dropped from $2,134,807 in March to $1,802,236 in April. The tax on carbon-black production dropped from $159,369 in March to $103,247 in April.

SANTA FE, N. M.—The New Mexico Oil Conservation Commission has set the state's oil-production allowable for June at 227,776 bbl. daily — unchanged from the May figure.

VESSELS on the left remove condensed liquids from engine-exhaust gas at Carter Oil's 1 J. B. Jones, Conway County, Arkansas. Cooling before and after the first stage of compression is carried out in the tube-type heat exchangers at right. The rig belongs to B. H. McGraw.

NATURAL GAS powers these compressors in the compression of engine-exhaust gas for drilling. The compressors and other special equipment on the well were furnished by Carter. The drilling engines plus the compressors furnish more than enough exhaust gas.

New Drilling Method

Use of exhaust gas instead of mud gets better results in northwestern Arkansas' hard rocks; lower cost claimed

Ed McGhee

CONWAY, Ark. — A new drilling technique — using engine - exhaust gas instead of drilling mud—is greatly increasing penetration rates in the extremely hard formations of Northwest Arkansas.

Operators in this area feel exhaust-gas drilling may prove to be the answer to the problem of lowering extremely high costs of conventional drilling in hard rock. Not only have increased penetration rates been obtained, but bit performance has been improved over mud drilling.

The test is being conducted on a rank wildcat, the 1 J. B. Jones. It is about 100 miles north of the nearest oil production and about 85 miles east of the nearest gas production. Drilling has reached about 2,500 ft.

This use of compressed exhaust-gas for drilling was pioneered by Western Natural Gas Co. in a Sebastian County well drilled by the L. B. Jackson Drilling Co. of Tulsa in late 1953. Since that time, Western Natural and Carter Oil Co. have used the new method in several other wells scattered over Northwestern Arkansas.

Conventional gas drilling is not practical in the area because there is no supply of cheap gas available. Drilling with air is considered dangerous because many wells encounter low pressure gas sands at varying depths. Gas volumes are not ordinarily great, but they are often sufficient to form explosive mixtures with air.

How it works . . . Exhausts of the engines are manifolded together by means of a flexible metal hose. Natural-draft atmospheric heat exchangers reduce the temperature of the exhaust gas until included water is condensed out.

After conventional separators take out the water and other liquids, the inert gas is compressed for circulating in the well.

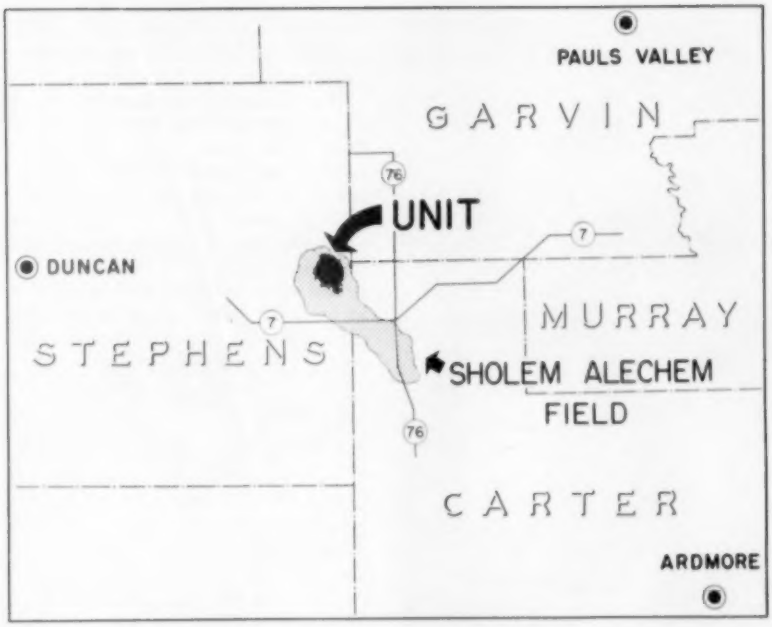
Combined exhaust from all drilling engines and compressor engines is more than sufficient in volume to achieve optimum circulation rates.

Court Gets Gas Question

LIBERAL, Kan.—A court here has been asked to decide whether Panhandle Eastern Pipeline Co. can be compelled to buy gas from a newly established deep zone in Hugoton field.

Panhandle and Terminal Facilities, Inc., a Cities Service subsidiary, signed a contract in 1947 in which Panhandle agreed to purchase all gas from new Terminal wells in Seward, Morton, Stevens, and Grant counties.

Production in this area has always been from the Chase sand at 2,700-800 ft., but Terminal opened a new deep producing zone in the Toronto lime at 4,190-210 ft. early this year.



Big Flood Planned

Sholem Alechem project expected to boost future recovery from 5,370,000 to 54,000,000 bbl., extend life of area

Ted Armstrong

TULSA.—A water flood expected to add to future recovery nine times the amount of oil recoverable by primary means alone is planned for a 2,440-acre segment of Sholem Alechem field in southern Oklahoma.

The area involved is Fault Block "A" which lies in the northwest end of the field (See map). It is delineated on the east and west by faults which completely separate the block from adjacent production, on the north by dip of the pay zone below the oil-water contact, and on the south by porosity pinchout.

Developing plans for the flood is a committee representing the 16 operating companies. Largest operators in the block are Amerada Petroleum Corp., Atlantic Refining Co., Champlin Refining Co., Magnolia Petroleum Co., Stanolind Oil & Gas Co., and Sun Oil Co.

Recovery estimate . . . The committee's reservoir engineers estimate that under the existing primary means Fault Block "A" would produce an additional 5,370,000 bbl. over the next 9 years. With the proposed water flood, they believe that an additional 48,630,000 bbl. of oil will be produced and that the life of the area will be extended to 1976.

As cumulative recovery totaled 24,300,000 bbl. at the beginning of this year, the anticipated oil from water flooding would bring eventual recovery up to 78,300,000 bbl., more than 2½ times the over-all total of 29,670,000 bbl. expected from primary means.

The operating companies are proposing a water flood of the Sholem Alechem Sims sand, which is reasonably well developed and continuous over the entire unit area.

The field . . . Sims sand production was opened in Sholem Alechem by Stanolind in August 1947. It was the first Springer production in this field, which had produced for a number of years in shallower formations.

The deeper production was drilled originally on 20-acre spacing and later developed on 10-acre spacing. Fault Block "A" was fully drilled by late 1951. There are 244 producing wells in the proposed unit area.

Gravity of the oil varies from 20° to 32°. Viscosity of the oil is high and gas in solution under initial reservoir conditions was only about 230 cu. ft. per barrel. Bottom-hole pressure, 1,350 psi. at the time of discovery, has already dropped to 250 psi.

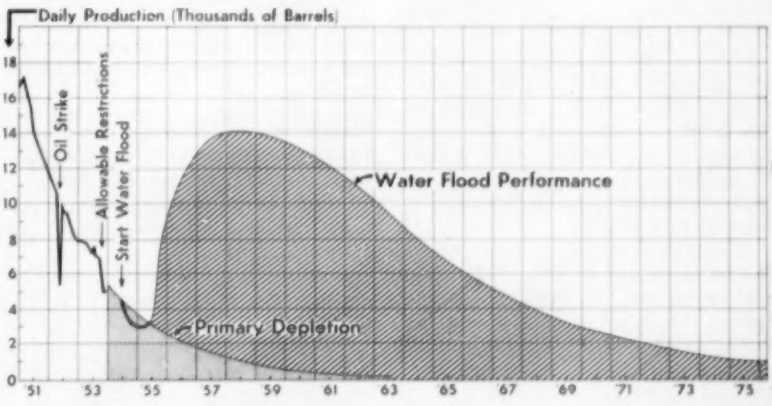
Engineers of the operating committee estimate that only 10.5 per cent of the original oil in place would be recovered by primary means. The flood, they estimate, would boost this figure to 27.4 per cent.

Participation formula . . . The unitization proposal contains a "split formula" for determining distribution of produced oil under the unit plan. One portion of the split formula allocates the remaining primary oil, while the second allocates all secondary oil to be produced.

In brief, the formula provides that when the unit becomes effective, production will be allocated according to the ratio of the value of oil run from each tract to the value of oil from the entire unit area. This will remain effective until cumulative production in the fault block has reached 29,670,000 bbl., the total expected under primary means.

At this point, the second half of the formula will become effective. From here on the oil will be allocated 50 per cent on the basis of value of oil, as in the primary recovery formula, and 50 per cent on the ratio of net acre-feet under individual tracts to the net acre-feet under the entire unit.

Value of oil is used in this formula rather than quantity because of the gravity difference in the oil in the reservoir.



Odeco Barge Finished

Huge submersible drilling barge ready to leave yards for Shell's location off the coast of South Louisiana

William P. Sterne

NEW ORLEANS.—A huge submersible barge designed to drill for tidelands oil and gas in 40 ft. of water will leave the Florida Avenue yards of Alexander Shipyards, Inc., here within a few days for a location off the South Louisiana coast.

The Ocean Drilling & Exploration Co. barge will be moved to a location staked by Shell Oil Co. It will be used by Odeco for contract drilling until the firm acquires its own properties and becomes an independent operator.

The Odeco barge is the first of a line of barges designed to drill in deep coastal waters, float off, and move quickly to another location without the necessity of installing expensive permanent piling for template platforms.

Most of the drilling equipment on this barge is contained in the lower pontoon or hull section, which is sunk to the ocean floor during drilling operations *(The Oil and Gas Journal, February 8, page 96)*.

It is huge compared to other barges and measures 220 ft. long, 74 ft. wide, and extends 63 ft. from the bottom hull to the upper deck. The unit has a displacement of 3,700 tons with all equipment. Its cost is in the neighborhood of $2,000,000.

How it works . . . The barge will be towed to the well location by tugs and sunk to the ocean floor by flooding ballast tanks which surround the drilling machinery in the hull. During drilling, the cementing equipment, mud pumps and diesel-electric engines and generators, which furnish power to the draw works, remain submerged.

The engine room is protected by ⅝-in. steel plate, and large blowers on the upper deck will circulate fresh air to the room below water. Engine exhaust fumes will go out one of the big caissons which join the upper deck and the hull.

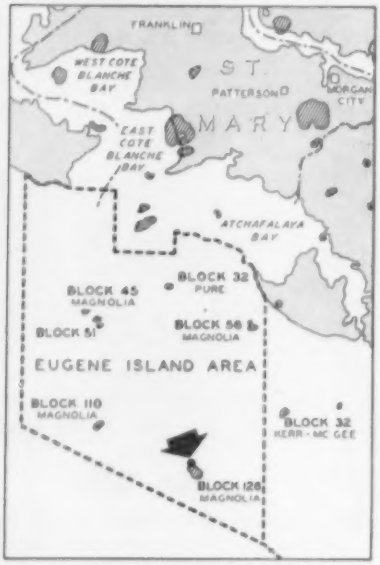
A pile driver on the upper deck will install a platform for the well head after a well is completed and the crew will pump out ballast water and refloat the barge.

Equipment . . . The barge was adapted from a plan conceived by John T. Hayward, former engineer for Barnsdall Research Corp., Tulsa. Alden J. Laborde, president of Odeco, added innovations.

The mast is a 140-ft. cantilever type with a gross nominal capacity of 1,035,000 lb. and can drill to 20,000 ft. The rig is fitted with a steam-type draw works, electrically driven by a 1,500-hp. d.c. motor.

The power plant consists of two opposed-piston, 10-cylinder diesel engines, each rated 1,600 hp. at 720 r.p.m. Each engine will drive four generators, two 1,200 kw. and two 400-kw., and either unit of an engine and four generators is capable of operating the entire rig.

The rig is equipped with two 7½ by 18-in. slush pumps and a 7¾ by 16-in. pump for mud mixing.



New Zones Found

Magnolia finds 800 ft. of pay in Eugene Island test

MORGAN CITY, La.—Additional oil reservoirs of possible major importance have been discovered in Eugene Island Block 126 field, 30 miles off the coast of St. Mary Parish.

A new discovery well, the 4-F State Lease 691 on the north side of the field, last week logged approximately 800 ft. of net effective oil-saturated sand in a total of 17 different zones.

More than 200 ft. of this sand was at depths above 5,450 ft. in the well, drilled to a total depth of 8,650 ft. The discovery was reported by Magnolia Petroleum Co., joint operator in the field with Continental Oil Co. and Newmont Oil Co.

Production tests have been made in two of the zones, both new producing horizons in the field.

From the lower zone, the well flowed at the rate of 512 bbl. of 39.4°-gravity oil daily through 12/64-in. choke with pressure of 2,000 psi. and gas-oil ratio of 2,000 cu. ft. per barrel.

Tests in a shallower zone at 7,265-86 ft. resulted in a flow rate of 349 bbl. of 38.2°-gravity oil per day through 13/64-in. choke with 925-psi. pressure and gas-oil ratio of 648 cu. ft. per barrel.

Eugene Island Block 126, farther offshore than any other field so far uncovered, was discovered in July 1949. Ten oil and two gas wells have been completed to date with multiple productive horizons ranging in depth from 6,500 ft. to below 12,200 ft. Four dry holes have been drilled.

This latest offshore strike could prove even more important than offshore discovery by Magnolia and others off Cameron Parish *(The Oil and Gas Journal, page 124)*. This well tested 406 bbl. daily from 8,143-50 ft.

The West Cameron wildcat is jointly owned by Magnolia and Continental Oil Co. and Newmont Oil Co., a wholly owned subsidiary of Newmont Mining Co. Felmont Oil Co. earlier was erroneously reported as having an interest in the operation.

Offshore Test Encouraging

HOUSTON.—Shows of oil and gas have been found by Standard Oil Co. of Texas in its wildcat 20 miles southeast of Corpus Christi in the Gulf of Mexico.

If completed as a producer, it would be the first well in the open waters of the Gulf off Texas.

The test, the State 948-53 is 1½ miles off Kleberg County. Last week it was drilling below 8,860 ft., and Standard of Texas said it would deepen the hole to about 9,500 ft. before running casing and testing.

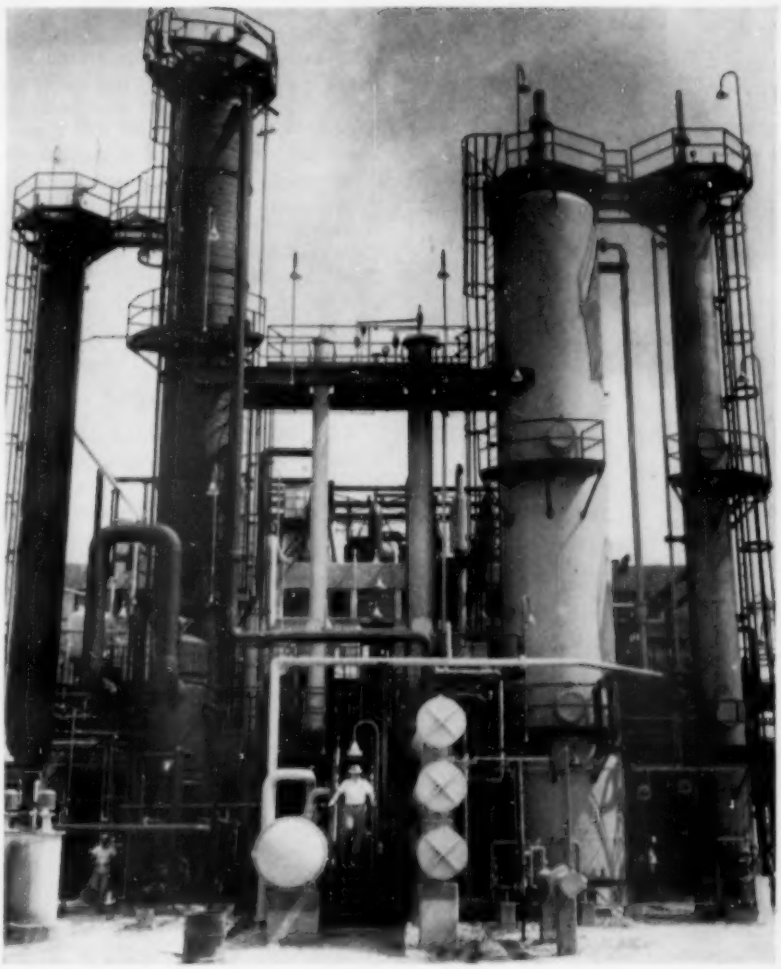
The company holds 18,000 acres of offshore leases in the area. The test is being drilled from a template-type permanent platform.

Gathering Tax Attacked

BATON ROUGE.—Constitutionality of Louisiana's gas-gathering tax has been challenged in a district court here by Louisiana Nevada Transit Co., of Ada, Okla.

Louisiana Nevada asked that $10,000 paid in taxes during the first quarter of this year be returned. The company says it purchased about 1 billion cubic feet of gas during the period and moved most of this to Arkansas.

The Louisiana legislature, now in session, has been working on legislation to make the current law conform to the recent ruling of the U. S. Supreme Court which held a similar Texas tax unconstitutional.



New Texas Plant To Expand

ORANGE, Tex.—The dedication here last week of Texas' newest petrochemical plant included an added treat—announcement of plans to expand the plant for production of additional products.

Hugo Reimer, president of the Nitrogen Division, Allied Chemical & Dye Corp., disclosed during his dedicatory remarks that the company's new plant here will be expanded to manufacture ethanolamines. The plant currently is producing ethylene glycols and ethylene oxide.

Reimer said plans for the expansion are in the engineering stage, with construction scheduled to start in the near future. The expansion will be completed within a year, he added.

The expansion is natural for the Nitrogen Division since ethanolamines are manufactured by the reaction of ammonia and ethylene oxide, a base product of the Orange plant. Ammonia is scheduled to be shipped into the plant where the synthesis of mono-, di-, and tri-ethanolamines will be made.

The first installation to use Scientific Design Co.'s catalytic oxidation process for making ethylene oxide, ethylene glycol, and diethylene glycol is located in the $5 million plant.

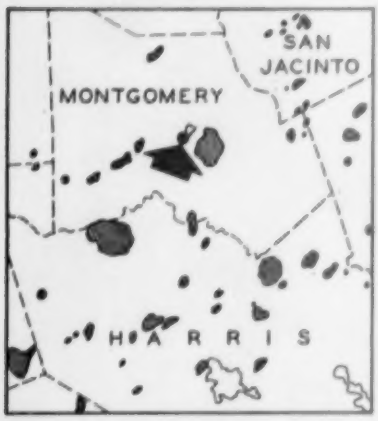
Ethylene is fed to the plant by Gulf Oil Corp.'s ethylene pipeline, which has a spur running from its Port Arthur ethylene manufacturing facilities to Orange. The spur also distributes the raw material to DuPont Co.'s nearby plant.

It also will feed the Goodrich-Gulf Chemical Co. and Spencer Chemical Co.'s plants, which are under construction near the new Allied plant.

The organization that is now the Nitrogen Division designed, constructed, and operated the first commercially successful synthetic ammonia plant in the United States. The division is one of six Allied operating divisions and has three other plants. These other

plants are located in Hopewell, Va., South Point, Ohio, and Omaha, Neb.

The Orange plant was started in January 1953, with the first ethylene oxide produced in February, and the first glycols in April. General contractor was Austin Co., Houston.



New Conroe Grows

Third producer, deep pay zone found in Texas field

HOUSTON.—A third producer and discovery of a deeper pay zone has increased the importance to the new Conroe Townsite field 40 miles north of here.

The oil producer was completed in the area's 5,100-ft. Cockfield sand. The deeper pay zone was discovered in another well now testing about 1½ miles southwest of present production.

This townsite area, opened for production last February, fast is becoming one of the more active spots on the Texas Coast with five drilling rigs now running and locations already made for seven additional tests.

It is less than 3 miles west of the 23-year-old main Conroe field, the Gulf Coast's first and largest Cockfield producer and still among the Texas Coast's more important reserves. It lies between the townsite and the three-well Risher field, with which there also may be a connection.

Latest producer, located just west of the townsite, is Humble Oil & Refining Co.'s 1 Conroe Townsite Oil Unit 136, completed with flow rate through ¼-in. choke of 269.52 bbl. of 36°-gravity oil at 330-psi. pressure. The gas-oil ratio was 177 cu. ft. per barrel. Producing interval, in Cockfield sand, is 5,122-28 ft.

The possible new-pay discovery and extension well is Humble's 1 Federal Royalty, located slightly more than 2½ miles southwest of the townsite and 1½ miles southwest of the area's discovery well. Tests made in a Yegua sand interval at 6,232-41 ft. have indicated the well good for 10,000,000 cu. ft. of gas daily on open-flow potential with a gas-liquid ratio of 98,000 cu. ft. per barrel.

The field's discovery well, located a mile southwest of the townsite, was drilled by Moran Corp. and Gar-Flo Oil Co. The same operators confirmed their discovery last month with a comparable good well 944 ft. to the northwest.

Nona Mills Unit Asked

AUSTIN.—General Crude Oil Co., Houston, has asked the Texas Railroad Commission to approve unitization of all producing Yegua sand formations in the Nona Mills fields area of Hardin County, Texas.

Plans for a gas-injection program, which General Crude estimates will recover an additional 2,000,000 to 3,000,000 bbl. of crude and condensate, already has been approvied by the commission.

So far, according to J. W. Cutbirth, vice president and head of the land department for the company, about 95 per cent of operating interests and 74 per cent of royalty interests have signed the unit agreement.

Seven sands discovered in the field to date are producing oil or gas. Only two, the "I" and "G" sands, are producing oil.

There are about 2,500 surface acres in the proposed unit area, Miller said. Participation factor is based on acre feet of oil pay times three plus acre feet of gas pay.

Gas-Price Bill Introduced

BATON ROUGE.—A bill aimed at setting minimum field prices for natural gas in Louisiana has been introduced in the state house of representatives and referred to the conservation committee.

The bill would empower the commissioner of conservation to set minimum well-head prices in individual fields, without attempting to determine "fair" or "going" prices.

Object of the legislation, according to its authors, would be to promote equitable and ratable taking, prevent discrimination in marketing, and reduce waste. A circular accompanying copies of the bill emphasized that half of Louisiana's gas is moved out of the state and that the low cost of gas as compared with oil and coal tends to "wasteful use."

Natural-Gas Briefs

Transcontinental Gas Pipe Line Corp. has applied to Federal Power Commission for authority to build a 25-mile, 12-in. line in Cameron and Calcasieu parishes, Louisiana, The line would give the company access to additional natural-gas reserves in Orange, Chambers, and Jefferson counties, Texas. Texas Gas Pipe Line Corp. filed a concurrent application with FPC asking for authority to build 2.37 miles of 12-in. line to enable it to deliver the gas to Transcontinental.

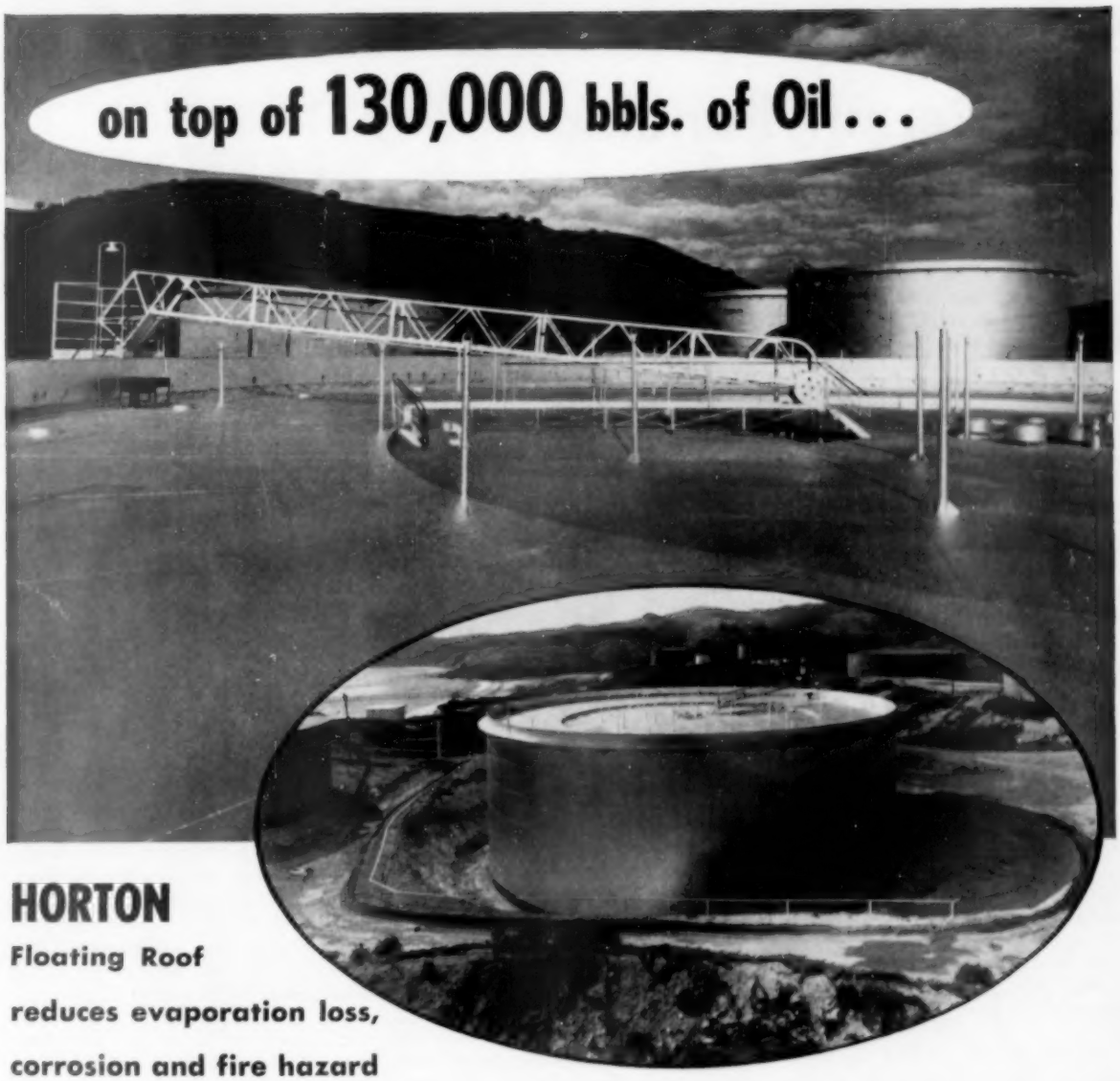
Kansas-Nebraska Natural Gas Co., Inc., has received a favorable decision from Examiner Francis L. Hall on its application to build 40 miles of line in Kansas and Nebraska. The new facilities would permit movement of larger quantities of gas eastward from fields in Big Springs, Nebraska, and Logan County, Colorado. Hall also granted a company request to delete 98 miles of proposed pipeline in Kansas no longer required.

Mississippi River Fuel Corp., St. Louis, Mo., has requested FPC authority to make connections to its present line and to build the necessary facilities to supply 10,000 to 12,000 M.c.f. of gas daily for use as a raw material in a new ammonia plant. The company proposes to build the ammonia plant in the vicinity of St. Louis and expects to be on stream by November 1955.

The FPC has suspended a $13,616,-000, or 10.3 per cent, rate increase requested by Tennessee Gas Transmission Co. The commission said that the requested increased rates "have not been shown to be justified."

The FPC has issued a certificate to El Paso Natural Gas Co. authorizing it to construct 32½ miles of line in Upton and Reagan counties, Texas. The new facilities will enable El Paso to acquire 20 M.c.f. of gas daily from Barnhart Hydrocarbon Corp.'s plant in Reagan County and deliver it to El Paso's existing system in Upton County.

Central Hudson Gas & Electric Corp. has asked the FPC to order Tennessee Gas Transmission Corp. to supply it 11,000 M.c.f. of gas daily at a point near Albany, N. Y. The company also asked a permit for a 48-mile, 12-in. line to move the gas to Kingston, N. Y. Central now buys gas from Home Gas Co.



HORTON

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reduces evaporation loss,

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This 130-000-bbl. tank is equipped with a Horton® Pontoon Floating Roof. Floating directly on the surface, the entire bottom of the roof is normally in contact with the liquid in the tank. There is no air-vapor mixture above the liquid to be vented and lost. Fire hazard and corrosion are also reduced as a direct result of the elimination of the vapor space.

Space between the rim of the roof and the tank shell is closed by a Horton Seal — standard equipment on all Horton Floating Roofs. This device assures the utmost in efficiency . . . it effectively prevents evaporation loss and helps keep the roof centered at all times.

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Boston, 10 ..... 1025-201 Devonshire St.
Chicago, 4 ..... 2128 McCormick Bldg.
Cleveland, 15 ..... 2204 Midland Bldg.
Detroit, 26 ..... 1514 Lafayette Bldg.
Houston, 2 ..... 2119 C & I Life Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615—1700 Walnut Street Bldg.
Pittsburgh, 19 ..... 3228 Alcoa Bldg.
Salt Lake City, 4 ..... 825 West 17th South St.
San Francisco, 4 ..... 1554—200 Bush St.
Seattle, 1 ..... 1325 Henry Bldg.
Tulsa, 3 ..... 1606 Hunt Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo, N.V., 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo 275, Grupo 306, Rio de Janeiro, Brazil

Line Permit Pending

North Dakota Natural must meet 16 conditions in 30 days for final approval; changes in Amerada contract required

BISMARCK.—The Public Service Commission has announced it will issue a pipeline certificate to North Dakota Natural Gas Transmission Co. if 16 conditions are met within 30 days.

North Dakota Natural proposed to build and operate a $10,700,000, 474-mile pipeline to transmit natural gas from the Signal Oil & Gas Co. gasoline plant at Tioga eastward to Fargo and Grand Forks.

In a unanimous decision, the commission authorized the line as proposed except that the city of Tioga shall receive firm gas in addition to Stanley, Minot, Velva, Harvey, Carrington, Jamestown, Fargo, Devils Lake, and Grand Forks.

Three of the commission's conditions concern the contract held by North Dakota Natural with Amerada Petroleum Corp. to buy the gas produced with oil from Amerada's well in Beaver Lodge and Tioga fields.

Among the conditions required by the commission are:

... **Modification** of a contract clause requiring the transmission company to purchase gas in excess of the 25 million cubic feet it is obligated to buy between November 1, 1954, and January 1, 1958. The commission ordered this changed to an option to buy the excess gas.

"Concievably such a provision could bankrupt the applicant if the amount of gas it was required to pay for should substantially exceed the amounts it could profitably market," the order said.

... **Completion** by September 30, 1957, of a well or wells in the Silurian formation capable of producing 30 million cubic feet of pipeline gas daily as a standby supply if oil and gas production should be curtailed.

... **Elimination** of a provision linking the price of gas to increases in price of No. 6 fuel oil at Houston.

... **Filing** by North Dakota Natural of copies of gas contracts with off-peak industrial users which will yield the company $1,275,000 in the third year.

... **Submitting** a report by June 1, 1956, from "a competent geologist" on underground storage fields.

... **Presenting** a commitment to use underground storage starting September 1, 1956.

... **Starting** construction by August 15, 1954, and completing the line within a year.

The commission ignored a brief filed by Northern Natural Gas Co. of Omaha which protested that North Dakota Natural had failed to make a case *(The Oil and Gas Journal, May 17, page 82)*. Northern Natural offered to build and operate a line this year if it could get a North Dakota gas contract. Northern planned to later make the North Dakota segment part of its proposed line.

The line was unsuccessfully opposed by lignite companies, the United Mine Workers, and railroads on grounds that the sale of industrial gas would displace lignite as a fuel.

Colorado Unit Approved

DENVER.—The undeveloped 14,993-acre Prairie Unit in southwestern Colorado's Garfield and Mesa counties has been approved by the U. S. Geological Survey.

The south side of the block extends to within a mile of the Bar-X Unit and is about 5 miles west of the Garmesa Unit. It is south of an abandoned wildcat drilled by Forest Oil Co. last year.

The Bar-X unit, operated by Frontier Oil Co. produces gas on both sides of the Colorado-Utah line from the Morrison and Dakota sands and production has been established in the Garmesa unit.

El Paso Natural Gas Co., operator of the newly approved unit, has not made location for a well on the new block.

Adena Production Climbs

DENVER.—With 115 of the 180 oil wells completed so far in Colorado this year, Adena field in Morgan County has jumped into second place among the state's producing fields.

Rangely still holds first place in the amount of production, but Adena has consistently shared the Rocky Mountain limelight with Wyoming's Weston County Clareton Newcastle producing trend during 1954.

More fuel has been added to the Adena fire by Lion Oil Co. 1 Bruce, an outpost more than 1 mile west of previous Adena production. Oil has been rfecovered on drill-stem tests, indicating another extension to this new big field.

San Juan Strike

Phillips gets big gas flow from Pictured Cliffs sand

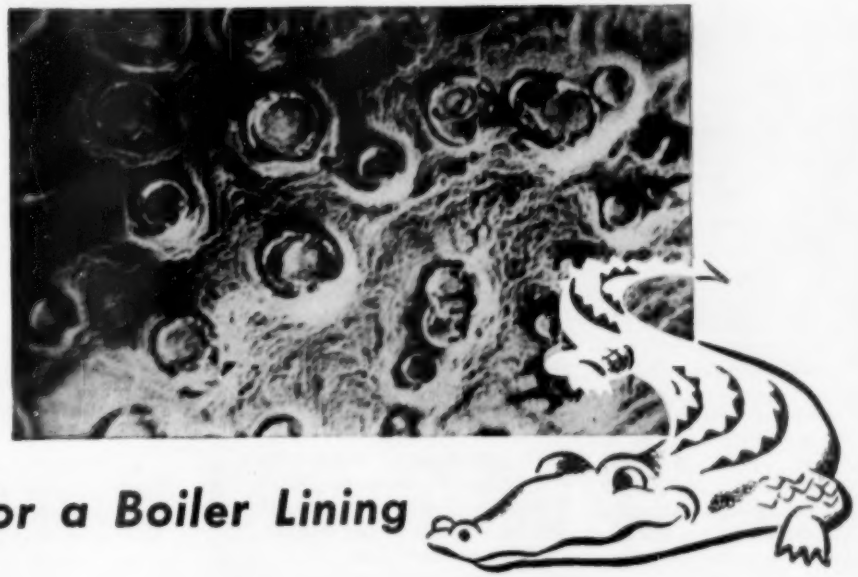
FARMINGTON, N. M.—An important new gas strike in the San Juan basin was reported last week by Phillips Petroleum Co.

The wildcat, the 1 Indian-E in Rio Arriba County, recovered gas at a rate greater than 20,000,000 cu. ft. per day. While Phillips did not officially confirm reports of its test, the flow rate was reported as the largest gage on record from Pictured Cliffs sand in the San Juan basin. The well is 2 miles east of previous Pictured Cliffs production. These wells were completed on much smaller gages.

The strike is considered important, too, because of the recent recommendation of Federal Power Commission attorneys that a certificate not be granted Pacific Northwest Pipeline Corp. for a gas line from the basin to the Pacific Northwest. Principal reason was the question of whether reserves were sufficient to support the line *(The Oil and Gas Journal, May 17, page 85)*.

Phillips has committed gas already developed and that to be developed on substantial amounts of acreage in the area to Pacific Northwest. Possible reserves in the area of Phillips' test were not considered in the evidence presented to the FPC in support of the Pacific Northwest line.

Alligator Hide



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Pegasus Plan Approved

Commission approval for third largest secondary recovery program comes after last-minute deal with Superior made

Robert J. Enright

DALLAS.—The Texas Railroad Commission last week approved the mammoth unitization and pressure-maintenance project proposed by Magnolia Petroleum Co. for Pegasus field of Midland and Upton counties, West Texas.

The project is one of the largest in the world, ranking third in the United States from standpoint of additional oil recoverable—in excess of 140,000,000 bbl. It is topped only by the huge East Texas field program and the SACROC unit project in Kelly-Snyder field in West Texas.

The unit takes in almost 17,000 acres and 183 producing wells in the 21,000-acre field. Pressure maintenance will be conducted in both the Pennsylvanian and the Ellenburger formations in the field. Pilot water and high-pressure gas injection operations will be launched in the Pennsylvanian, and water injection started in the Ellenburger.

In addition to its size, the project has the added distinction of incorporating the deepest water flood ever attempted at 13,000 ft. in the Ellenburger.

High-pressure gas injection into the Pennsylvanian producing strata will begin probably by mid-July, a Magnolia spokesman said last week. The unit expects to begin injecting water into the Pennsylvanian by the middle of August and into the Ellenburger shortly thereafter.

All equipment needed for the pressure-maintenance program has already been purchased, with Magnolia the unit operator, footing the bill pending commission approval of the unit. It is believed that contract for construction of a water-injection plant will be let late this week or early next week.

Compression facilities needed for the gas-injection operation already are available at the Pegasus gasoline plant, from which residue gas will be furnished.

Injection plans . . . The Ellenburger flood, which at first will employ only one input well, in the extreme eastern portion of the field, later will be expanded to a field-wide peripheral injection program at a cost of about $6,000,000. Water input at the start will average about 10,000 bbl. daily. This is considered sufficient to take care of 43 per cent of current reservoir voidage.

Roughly 4,000 bbl. of water will be injected initially into the Pennsylvanian through four input wells in a five-spot pattern in the north-central part of the field. At the same time, about 4,850,000 cu. ft. of gas daily will be injected into the formation at a pressure of 4,700 psi. Through the lone gas input well in the southwestern portion of the field. Either water or gas injection, depending upon which pilot performs best, will later be extended throughout the field.

Field still young . . . Neither the Ellenburger nor the Pennsylvanian is completely developed, but both are considered reasonably well defined.

There are now about 107 wells producing from the Ellenburger and about 76 from the Pennsylvanian. It is estimated that the present total of 183 wells in Pegasus will be swelled to about 365 when all proved acreage is completely drilled, with about 175 of them producing from the Ellenburger, 190 from the Pennsylvanian.

Magnolia, which discovered the field, is by far the largest operator, controlling about 79 per cent of the surface acreage in the field. There are 39 companies and individuals participating. Other operators with substantial holdings are Gulf Oil Corp., Phillips Petroleum Co., and Sharples Oil Corp. The Ellenburger was discovered in 1949, and the Pennsylvanian in 1951.

Snag avoided . . . Railroad Commission approval was made official as of May 25. Before that action, it appeared for a time the plan might be derailed temporarily. Such a development appeared possible when the commission ruled earlier that it would take no action on the application to initiate the program until all parties interested in joining the unit before commission approval had been offered the opportunity.

The ruling came as a result of a dispute between Superior Oil Co., Magnolia, Gulf, and other operators.

Superior contended it had sought to join the unit on the same basis as other operators and had been denied the opportunity. The company objected to provisions in the unit agreement setting one participation basis for operators who signed the agreement before its effective date and another for those who signed later. It said that it had been denied the right to sign prior to the effective date.

Magnolia challenged Superior in the latter respect, contending Superior had been continuously requested to join the unit. Magnolia said that setting such an effective date and penalty for later signing is absolutely necessary to get a unit going. It also is a necessity in such an operation, the company argued, to outline a unit area and draw up contracts before efforts to obtain signatures begin. When Superior finally decided to join, Magnolia contended, it was impractical to revise all the exhibits which had been prepared and to go back and resecure the 300 or more signatures which already had been obtained.

As a result of the commission ruling Superior agreed to withdraw its objection to unitization. The commission acted immediately after to approve the project. Magnolia officials refused to comment on terms of Superior's entry into the unit, but it is presumed, since the Superior objection was withdrawn, that the latter was offered equal participation with the original unit signers.

Refiners Overruled

Texas appeals court denies antitrust rehearing bid

AUSTIN.—The Third Court of Civil Appeals last week overruled motions filed by 10 major refining companies for a rehearing of the court's decision that antitrust law violation charges against the companies be tried in District Court.

The state charges that the companies conspired to raise the wholesale price of gasoline uniformly in 1946 and 1947 following the end of federal price controls. The companies contend that the price increases resulted from natural economic conditions rather than any conspiracy.

The charges were filed originally in a lower court and were dismissed by that court on grounds that the state failed to establish cause for action. The lower court decision was reversed by the appeals court earlier this year.

It is thought likely that the appeals court decision will be appealed to the

Dowell engineers use the latest treating techniques, specially designed tools and high-pressure, high-volume pumping equipment.

MUD CAKE REMOVED

Dowell Mud Acid treatment increased well potential 126 bbls. oil per day

A well had shown good oil saturation, but failed to produce when completed. The operator believed that mud and mud cake on the screen, perforations and the face of the pay was restricting oil flow. Dowell engineers, called on the job, recommended Mud Acid. Following the treatment, the well's potential was 126 BOPD, flowing.

Mud Acid is a special acid solution designed to dissolve clay minerals and destroy the swelling and colloidal properties of bentonitic materials — such as found in drilling mud. It is used to restore and increase permeability of critical zone at well bore, to clean liners, screens, perforations and the formation face.

Mud Acid is also used to free stuck drill pipe; to spearhead fracture treatments; to clean gravel packs; to increase capacities; and to reduce injection pressures of gas and water input wells.

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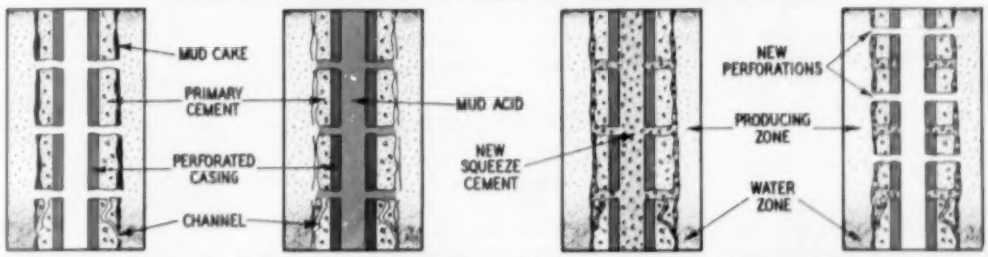
HOW MUD ACID ALSO HELPS IN SQUEEZE CEMENTING



1. Incomplete removal of mud cake produced a poor cement job. This mud may break down, permitting water or gas to enter well.

2. Dowell Mud Acid (used ahead of squeeze job) removed mud cake, cleaned old cement surfaces, exposed clean formation.

3. Following Mud Acid wash, squeezed cement penetrated open spaces . . . formed a good bond with the formation and casing.

4. Here is the well after excess cement had been drilled out and casing re-perforated. In this way, producing zone was isolated.

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State Supreme Court. This must be done before June 25.

The defendants are: Arkansas Fuel Oil Corp., Humble Oil & Refining Co., Phillips Petroleum Co., Standard Oil Co. of Texas, Gulf Oil Corp., Continental Oil Co., Cities Service Oil Co., Magnolia Petroleum Co., Sinclair Refining Co., and The Texas Co.

Gaines Devonian Looks Good

MIDLAND.—Another flush producer in southeastern Gaines County, Texas, may indicate the presence of a large underground structure.

Latest in deep strikes for this area is Felmont Oil Corp., Signal Oil & Gas Co., and Stanolind Oil & Gas Co. 1 Terrell County School Lands. The well drilled into the Devonian at 12,675 ft. and developed the heavy oil flow on the first 25 ft. of the section.

On the test, the well flowed the water blanket in 43 minutes, and had clean, flowing oil in 65 minutes. When turned into tanks it gaged 108 bbl. of oil in 1 hour. Choke sizes were not reported, but flowing pressure ranged to 4,975 psi.

Panhandle Gas Price Up

AUSTIN. — Texas Panhandle gas producers are being paid an average 14½ per cent more for their gas this year than last, the Texas Railroad Commission reported last week.

Present weighted average price for gas in the area at 16.4 psi. is about 8.57 cents per M.c.f., the commission found, as compared with 7.49 cents per M.c.f. last May. The present price is more than half a cent, or about 8½ per cent, higher than the approximate 7.94 cents price determined by the commission last November.

The price findings resulted from a commission hearing on the subject held early in May in Amarillo.

If converted to a pressure base of 14.65 psi., the commission said, the going Panhandle gas price is averaging about 7.66 cents an M.c.f.

Aztec Becomes Independent

DALLAS.—Aztec Oil & Gas Co., former wholly owned drilling and producing subsidiary of Southern Union Gas Co., is now operating independently.

Southern Union divested itself of all ownership interest early this year but has been operating Aztec since that time under an interim arrangement.

Aztec properties, all located in New Mexico, include more than 50,000 acres of producing leases, and interests in 9 oil wells, about 200 gas wells, and 70,000 acres of leases. Most acreage is in the San Juan basin fields of San Juan and Rio Arriba counties. The remainder is in fields in Lea and Eddy counties in the Permian basin.

Aztec also has an option to buy 130,000 acres of leases in New Mexico, Colorado, and Utah from Southern Union before the end of the year. About 20,000 acres of the total are now producing either oil or gas.

President of Aztec is Wofford Cain. Van Thompson, formerly manager of exploration for Southern Union, has been named executive vice president. Headquarters of both Southern Union and Aztec are in Dallas.

Lone Star Extending Line

DALLAS.—Lone Star Gas Co. has extended a main 12-in. north-south gas-transmission line in Smith County, East Texas, 20 miles to the south to connect with an east-west line originating in Carthage field, Panola County.

The new link will enable Lone Star to carry Carthage field gas north to Red River County on the Oklahoma state line, where the company will supply about 35,000,000 cu. ft. of gas daily to Texas Power & Light Co.'s new Rivercrest power plant.

The company also has started construction on a 15-mile, 6-in. gathering line in Coke and Runnels counties in West Texas and is preparing to start work on a new 17½-mile, 8-in. gathering line in Haskell and Stonewall counties in North-Central Texas.

The 15-mile lateral will extend from an existing line near Fort Chadbourne in Coke County to connect Gulf Oil Corp.'s Runnels gasoline plant in Runnels County. Construction is scheduled for completion this week.

The 17½-mile project will connect Stonewall Gas Products Co.'s Katz gasoline plant in northeastern Stonewall County with an existing north-south transmission line at a point north of Weinert in northern Haskell County.

Injection Project Started

DALLAS.—Lone Star Producing Co. has started construction of a compressor station and gas-gathering and injection systems for its projected pressure-maintenance operation in Pleasanton field, Atascosa County, Southwest Texas.

The company is installing a four-stage, 800-hp. compressor moved from Lee Ray field north of Cisco, Tex. It will be used to inject about 12,500,000 to 16,000,000 cu. ft. of gas daily into the Pleasanton formation through two injection wells.

The company is laying about 1½ miles of 4 and 6-in. gathering line and an equal amount of 4-in. pipe for the injection system.

Depth-Record Hole Is Dry

FORT WORTH.—The Richardson & Bass 1 J. F. Harrison-Federal has been completed dry as the deepest hole ever drilled in New Mexico.

The well, located in Section 12-25s-30e in southeastern Eddy County in the Delaware basin, was drilled to a total depth of 16,705 ft. in Devonian dolomite.

It was plugged back for testing in section further up the hole. These tests developed noncommercial shows of gas and distillate.

Well-Log Rule Revised

AUSTIN. — The Texas Railroad Commission has revised its Rule 11 regarding the filing of well logs. The revision resulted from confusion which followed the commission's May 1 memorandum on the subject.

The revised rule requires operators to file in duplicate within 30 days after completion a complete well record or log on Form 2 with the deputy supervisor of the appropriate district. The rule applies whether the project is a new well, a deepening job, or whether a well has been plugged back to a different horizon.

If the well is an oil producer, Form 2 must be accompanied by a well-potential report (Form 3). Gas-well potential reports, on Form GWT-1, are to be filed in accordance with the provisions of Rule 24A.

The commission declared that no well will be assigned an allowable until the designated forms for that well have been submitted to the commission and accepted by it.

Gasoline Plant Work Begun

ODESSA. — Foundations are being poured for Stanolind Oil & Gas Co.'s compression-type gasoline plant in Midland Farms field, 26 miles north of here. The plant is scheduled for completion in early August.

The new plant will have a compression capacity of 10 million cubic feet of gas daily. Gas sweetening and gas dehydration facilities will be designed to handle 15 million cubic feet daily. Absorption and distillation facilities are not initially planned for the plant.

Gasoline Plant Construction Corp. has the prime contract for the plant, and Vaughn & Taylor Construction Co., Inc., has been awarded the contract for the field gathering system.

THE 1954 FLUOR FIN-FAN

offers improved engineering features for:

FLUOR LOUVER SHUTTERS mounted above the fin-tube sections offer protection during cold weather and regulate the flow of air across tubes to maintain constant exit fluid temperatures in frigid climates.

COLD WEATHER PROTECTION

For protection during severe cold and to prevent exit fluid temperatures from dropping below the design point, Fluor Fin-Fan air-cooled heat exchangers may be equipped with louver-type shutters over the fin-tube sections, or with rolling steel doors at ground level to regulate the flow of air across the extended surface. In extreme cases air can be recirculated to maintain desired temperatures. Fluor furnishes Fin-Fan installations for reliable performance under any weather conditions.

AUTOMATIC TEMPERATURE CONTROL

In addition to the above, Fluor makes available automatic temperature control equipment which, by means of varying fan speed, assures constant exit fluid temperatures. Savings in operational horsepower are also effected. The type of equipment available consists of variable speed fluid drives (hydraulic couplings) and variable speed hydraulic drives.

IMPROVED HEAT TRANSFER

Fins are applied to the tube so that each individual fin overlaps at its base and seals against the adjacent fin, completely encasing the entire length of the tube, thus resulting in improved heat transfer efficiency. Protected from exposure, tubes do not require a coating to prevent them from corroding. Fins remain rigidly in place with no opportunity to work loose. Tubes are furnished in Admiralty, carbon steel, aluminum or any other commercially available material.

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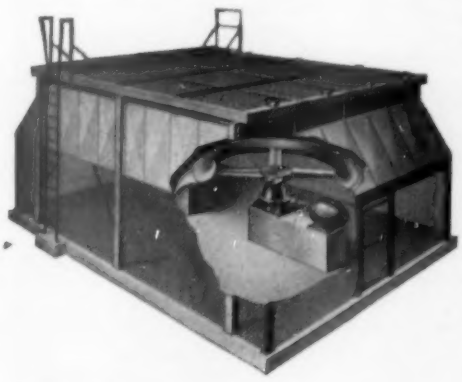
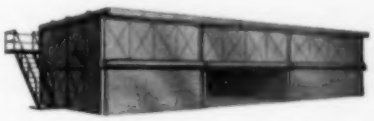
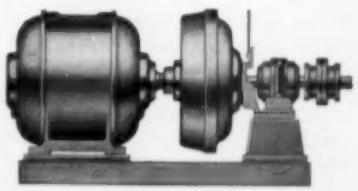
The Vibration Cut-Out Switch, which immediately cuts off power should excessive vibration occur, was developed and patented by Fluor. These switches have long been standard equipment on Fluor induced-draft cooling towers and Fin-Fans, and proved their worth by cutting off the power at recycle and gasoline plants during the earthquakes in and around Bakersfield in the summer of 1952. They also serve as a position on-off switch during routine inspections. Manual reset prevents motor from being started accidentally when the switch is in "off" position.

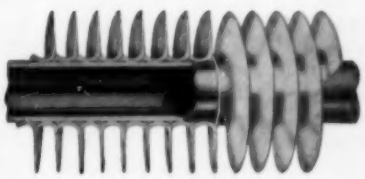




ROLLING STEEL DOORS may be used in place of shutters for controlling amount of cooling air through fan and for protection during severe cold weather.



VARIABLE SPEED FLUID DRIVE regulates fan speed automatically, controls temperatures, saves power, increases operational life of mechanical equipment.



FIN stock completely encases the tube from one end to the other to provide high heat transfer efficiency while protecting tubes from corrosion.

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Tanker Plan Approved

Senate endorses Navy plan for long-term charters of 20 super tankers, but U. S. "run-away" fleet is scored first

WASHINGTON.—Long-term chartering of tankers by the Navy was approved by the Senate last week and now goes to the House of Representatives for concurrence.

The legislation would authorize the Navy to enter into 10-year contracts for 20 new "super" tankers at a cost of not to exceed $5 per ton per month. The vessels would replace 37 T-2 type tankers which are to be placed in the reserve fleet.

The bill was opposed by Sen. Warren G. Magnuson of Washington, who assailed American tanker owners for transferring registry of their vessels to the Panamanian flag. This he declared was done for the purpose of evading taxes. He called it the "run-away fleet," but he announced early in the debate that he considered the need for tankers so great that he would not vote against the measure.

Magnuson asserted, however, that he felt the same objective could be reached at less cost by having the Navy build its own tankers. On the estimate that the new ships will cost around $7,500,000 each, he said the Navy could do this at a cost of $150,000,000 as against the $366,000,000 which he says the charter plan will cost.

Magnuson and Sen. John J. Williams of Delaware were successful in having a number of amendments incorporated in the bill, one of which would require the Secretary of the Navy to give preference to operators who are exclusively engaged in the operation of American flag ships in awarding the contracts.

Provisions . . . As passed by the Senate, the bill provides that while the ceiling of $5 per deadweight ton per month is to apply it is not to result in the recovery by the tanker owners of more than two-thirds of the construction cost of the ships.

During the charter period and for 10 years thereafter the tankers may not be transferred to foreign registry unless the Secretary of the Navy determines it would not be inimical to the national defense and the Secretary of Commerce decides the transfer would be in the national interest.

Magnuson charged the bill may prove to be "another give-away" to operators who would receive two-thirds of the cost of their tankers, with a profit, in 10 years and then have vessels which, under certain conditions, might be worth more to them in the remaining 8 or 10 years of their life than during the first 10 years.

While admitting that there appears to be no way legally of halting the transfer of vessels to foreign flag registry, Magnuson reminded the Senate that "this bill is here because so many of our ships have been registered under the Panamanian flag, and even under the Liberian flag."

Decision Delayed

Escalator clauses attract interest of Oil Compact

WASHINGTON. — Adoption by the Federal Power Commission of any rule outlawing escalator and "favored-nation" clauses in gas purchase contracts of interstate natural-gas companies will be opposed by the Interstate Oil Compact Commission, it was indicated last week.

The commission's interest in the matter was disclosed by the FPC in an announcement that it had granted a request of the Compact for more time in which to consider the matter and has postponed oral argument on the issue from September 9 to September 30.

The FPC is making an investigation to determine whether the pricing provisions have any reasonable relation to the economics of producing, gathering, or transporting natural gas and are in the public interest.

The escalation clause provides for automatic increases in price whenever the pipeline companies are permitted to increase their wholesale rates or whenever certain index figures are raised. The favored-nation clause calls for an increase to all producers in any field if any one of them receives a higher price from any transporter or if a bona fide offer to purchase gas has been made.

In announcing the investigation early this month the commission made clear its belief that it is generally desirable that the pipeline companies make long-term contracts for their supply, but intimated it also believes that contract provisions which are not in the public interest should not be approved merely for the purpose of extending the reserve contract period.

Five Interior Men Honored

WASHINGTON.—Five employes of the Interior Department whose work on oil and gas problems has been outstanding were awarded the department's distinguished service citation last week by Secretary Douglas McKay. They are:

. . . Clarence R. Bradshaw, assistant chief counsel of the Bureau of Land Management, a recognized authority on federal mining and mineral leasing laws who played a leading part in developing the regulations governing leasing in the outer Continental Shelf.

. . . William L. Eagan, who retired January 15 as chief of the minerals branch of the Osage Agency at Pawhuska, Okla., under whose administration more than 8,000 wells were drilled on the Osage reservation, producing more than 600,000,000 bbl. of oil.

. . . Ralph H. Espach, chief of the petroleum natural-gas branch of the Bureau of Mines at Laramie, Wyo., who has directed the work of the petroleum experiment station which has led to substantial increases in oil recovery.

. . . Harold P. Rue, chief of the fuels technology division and supervising engineer of the petroleum and oil shale experimental station at Laramie, who has made many contributions to the bureau's program for oil-shale experimentation.

. . . Harold M. Thorne, chief of the oil-shale research branch at Laramie, who has made many contributions to basic oil-shale research.

French to Seek Bids

WASHINGTON.—The French Government is inviting bids from American firms in connection with a number of petroleum products being constructed under the NATO program.

The invitation was extended through the Department of Commerce. In the near future, the department said, the French Government will call for tenders for 260 kilometers each of 8, 10, and 12-in. pipe and 150 kilometers of 4-in. pipe. Bids on the construction of a 50,000-cubic meter depot and installation of four pipelines, each consisting of 120 kilometers of 10-in. and 60

kilometers of 12-in. pipe, also will be invited. American firms wishing to participate should report their interest to Trappil, 12 Rue Jean Nicot, Paris, before June 7.

BDSA Adviser Named

WASHINGTON. — Arthur W. McKinney, president of the National Supply Co., Pittsburgh, last week was appointed adviser to the oil-field machinery branch of the Business and Defense Services Administration.

McKinney, who will serve without compensation, will assist O. T. Madsen, chief of the branch, on problems involving the future supply, both peacetime and emergency, of oil-field equipment.

The BDSA is planning a closed-door meeting with top executives of the industry, who will be asked to provide data on which the branch can base its calculations of future requirements. Also expected to be discussed at that meeting, scheduled for late next month, is the program developed by the BDSA for serving the equipment manufacturers.

The BDSA is a combination of what is left of the National Production Authority and the industry branches of the Department of Commerce. Its major responsibilities include the aiding of business in its peacetime activities and the gathering of information which would be of value in the event of another emergency requiring material, price and other controls.

New Advisory Board Meets

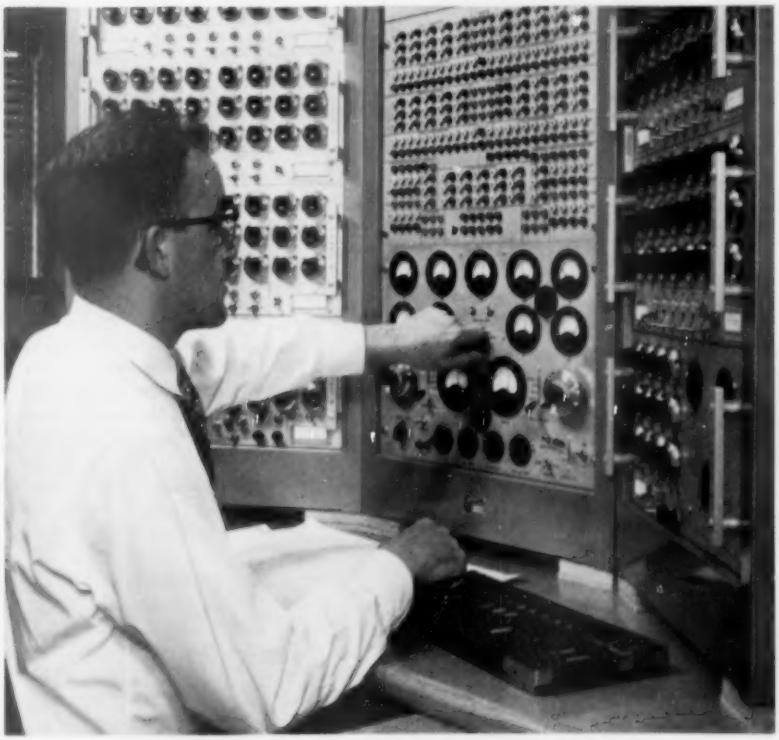
WASHINGTON.—Members of the new Military Petroleum Advisory Board held their first meeting last week to perfect their organization.

The meeting of the 21-man board was called by Assistant Secretary Felix E. Wormser, in charge of mineral resources, to acquaint the committee with the duties it will perform in advising the Defense Department on oil matters.

Drilling Tax Provisions Kept

WASHINGTON. — The Senate finance committee last week incorporated a provision in the tax-revision bill continuing the present system of permitting oil operators the option of capitalizing or expensing intangible drilling expenses.

The measure as passed by the House made no reference to the option and counsel for a number of companies urged the Senate committee to put it into the legislation so as to eliminate any doubt as to whether the practice is to be continued.



Ancient Abacus Aids Modern Research

Doug McGowan of Standard Oil Co. of California's Richmond, Calif., research laboratory staff keeps a primitive abacus at his right hand to aid his computation of gasoline blending on a late-model electronic computer. The abacus, a bead and string instrument originated about 800 years ago, keeps track of the numerous streams being run through the modern-day computer, which estimates how highest quality gasoline can be obtained from various base stocks.

One Hurdle Left

Senate floor debate final obstacle in depletion path

WASHINGTON. — Refusal of the Senate finance committee to accept the proposal to slash the oil and gas depletion allowance from 27½ to 15 per cent leaves only one more hurdle in the way of continuance of the higher rate for at least a year.

The vote in the committee was reported as "decisive," but Sen. John J. Williams of Delaware still can bring the matter up in the Senate when the measure comes up for debate next month.

The question of depletion was explored by the House ways and means committee during its hearings on the bill. Although it is doubtful it would have taken any action under any circumstances, the fact that depletion was one of several tax problems under study by the Treasury Department made it desirable to postpone the issue until next year.

Members of the Senate finance committee plan to introduce as few new controversial issues into the general tax revision legislation as possible to insure quick passage by the Senate. The committee was advised that the Treasury still has reached no conclusion from its study of depletion.

However, even if the matter had been considered on its merits, it is doubtful if the committee would have gone along with Williams' proposal in view of its action increasing the depletion allowance for uranium.

"Shortage" Bemoaned Again

WASHINGTON.—The cry, "We're running out of oil," was heard in Washington again last week.

It was attributed by Rep. John Jarman of Oklahoma to a General Services Administration directive exempting petroleum fuels and lubricants from the provisions of the Buy-American Act.

GSA officials, however, declared the directive did not raise any new situa-

tion, but merely formally recognized the industry practice of comingling certain imported oils with domestic oils.

The directive, dated April 5, was revealed on the floor of the House of Representatives May 25 by Jarman, who announced he would seek a full investigation of what he called an "easy distortion of the clearly established facts" which should not go unchallenged.

Red Tape Scored

USGS procedures slated for revamping by McKay

WASHINGTON. — Better liaison between the Geological Survey and the Bureau of Land Management to strengthen the authority of the former's field representatives is recommended by a committee of geologists appointed by Interior Secretary Douglas McKay.

This was one of the 46 recommendations being put into effect by McKay for improving the Geological Survey.

The study group called the present procedure for handling applications for leases and permits cumbersome and time-consuming. The application must be filed at a field office of the Bureau of Land Management, which sends it "through channels" to the minerals division of the BLM in Washington. From there it goes to the conservation division of the Geological Survey, which sends the application to its field engineers, who may be located in the same area as the BLM field office where it was filed. The engineers send the application back to Washington, where a full report is prepared and transmitted to the BLM. If the permit or lease is issued it is transmitted to the applicant through the field office.

The study group pointed out that sometime the process takes months and occasionally a year or more. It recommended that applications filed in field offices be referred immediately to corresponding offices of the Survey's conservation division. Final action could be taken in the regional office.

Five Tankers Mothballed

WASHINGTON.—The Military Sea Transportation Service is mothballing five T-2 tankers because of decreased military shipping requirements.

The tankers, which have been operating in the world-wide delivery of petroleum products for the armed forces, will be overhauled and inactivated in shipyards on the Pacific Coast before being placed in the reserve fleet.

WATCHING WASHINGTON

Bertram F. Linz

Gas Price Faces Fight

A fair field price for natural gas produced by regulated pipeline companies may still have a long way to go before it becomes effective.

Right now, the Federal Power Commission has before it petitions for rehearing of the Panhandle Eastern Pipe Line Co. case in which field price was granted. One was filed by the Michigan Consolidated Gas Co., involving the sales capacity of Panhandle. The others by the city of Detroit and the county of Wayne, Mich., question the commission's action on field price and revenues received by the company in connection with gasoline extraction.

If the commission grants any petitions, the already long-drawn-out proceeding may drag on for months. If it denies all petitions and puts its decision into effect, it may find itself questioned in the courts as it did in the Phillips Petroleum Co. case when it ruled it had no jurisdiction over that company's gas sales.

Just to make things more uncertain for the gas industry and the commission, legislation has been introduced in Congress specifically limiting the valuation of pipeline-produced gas for ratemaking purposes to the original cost of the reserves.

Streamlining in Effect

For the first time in its history the federal Government is having its operations surveyed by outside experts to streamline operations and improve procedures. Industrial concerns have been doing it for years.

Interior Secretary Douglas McKay, himself a businessman, has been a strong advocate of more modern procedures in government. In addition to the study of the Bureau of Land Management, a review of the Geological Survey has just been completed and the Bureau of Mines is under examination.

The survey teams, some of them commercial management experts and others composed of industry experts, are finding many government agencies "just growed." They take on one job on top of another and apply the same procedures, some developed generations ago, without any change to meet new concepts.

In the case of the Geological Survey the study group found its activities and ideas have kept pace with changing times but its internal organization was years behind. It made 46 specific recommendations for improving operations, involving major changes in organizational structure to permit the agency to keep pace with increasing demands for the complex services it performs.

Tariff Changes Proposed

Legislation giving the Tariff Commission full authority to adjust tariffs, subject only to veto by Congress, has been introduced in the House of Representatives.

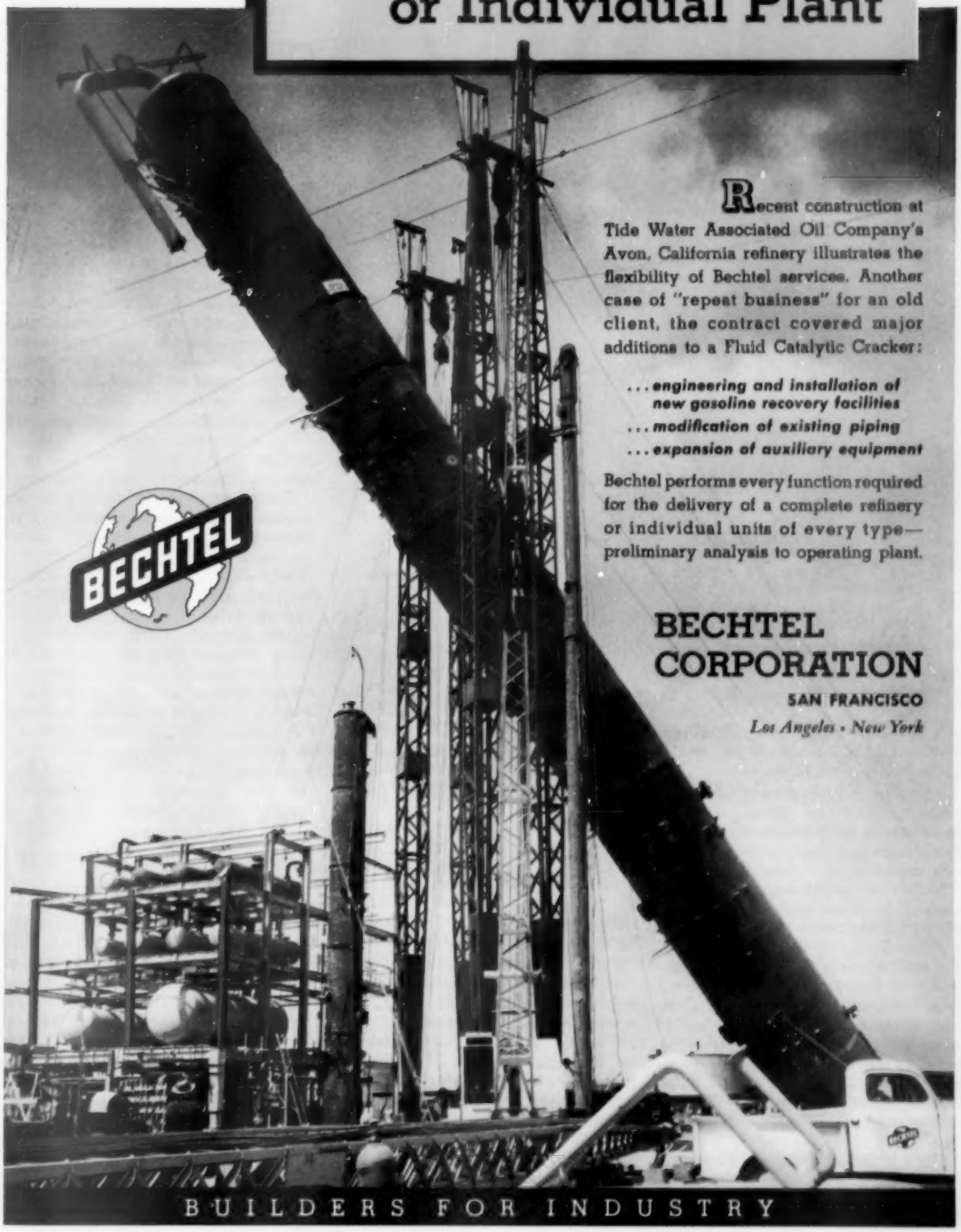
If enacted, it would give the domestic oil producers the first tariff break they have had in 20 years. The commission would have the power to raise import rates or provide a quota limitation, or both.

The bill, already sponsored by more than a score of congressmen, would not involve any general increase or reduction of present rates. The Reciprocal Trade Agreements Act, however, would be permitted to expire June 12 and the General Agreement on Tariffs and Trade would terminate in June 1955 unless previously specifically approved by Congress.

Under the proposed legislation, domestic producers who suffer injury from import competition could apply to the Tariff Commission for a duty adjustment. The commission would make an investigation and hold hearings. Any order issued as a result would be submitted to Congress and, if not voted down by either House within 60 days, would automatically go into effect at the end of that period. Import or export interests who feel that a particular rate of duty is too high similarly could apply to the commission for relief.

The principal change involved would be that final authority on tariffs would be transferred from the executive to the legislative branch and the tariff would no longer be used as an instrument of diplomacy or a means of bargaining for concessions from other countries.

Integrated Refinery or Individual Plant



Recent construction at Tide Water Associated Oil Company's Avon, California refinery illustrates the flexibility of Bechtel services. Another case of "repeat business" for an old client, the contract covered major additions to a Fluid Catalytic Cracker:

...engineering and installation of new gasoline recovery facilities

...modification of existing piping

...expansion of auxiliary equipment

Bechtel performs every function required for the delivery of a complete refinery or individual units of every type—preliminary analysis to operating plant.

BECHTEL CORPORATION

SAN FRANCISCO

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BUILDERS FOR INDUSTRY

German Plant Expanded

New 10,000-bbl. fluid catalytic cracker at Esso refinery cements Hamburg's position as center of nation's refining

NEWLY completed expansion and improvement at the Hamburg-Harburg refinery of Esso A. G. (Standard Oil Co. [N.J.]), have made this plant the largest in West Germany.

Dedication ceremonies were held recently to mark the opening of the major unit in the program, a fluid catalytic cracker of about 10,000 bbl. daily capacity.

Besides the catalytic cracker, the refinery includes an adjoining reforming unit and a distillation plant completed in 1951. Total crude charging capacity has now reached 1,840,000 tons annually, or about 37,000 bbl. daily.

Completion of the new Esso plant consolidates Hamburg's position as the center of the German refining industry. Hamburg now has more than a third of total German capacity of around 200,000 bbl. daily, and more than half of all crude imports through the Hamburg port.

The Esso refining center at Hamburg was built up from the old Ebano asphalt works. To provide for the expansion, a swampy marsh area of 2,583,000 sq. ft. near the old refinery had to be filled with 53,00,000 cu. ft. of river sand. Here a primary fractionating unit, furnace for thermal cracking, and the catalytic cracking plant were installed at a cost equivalent to about $12,000,000.

Saudi Arabia crude is processed in this new section of the refinery, while, as formerly, Tia Juana crude from Venezuela is treated in the older area. The German refining program allows Hamburg-Harburg 1,355,000 tons of Aramco crude, and 370,000 tons of Tia Juana crude in 1954.

In order to secure intermediate storage for crude and products at Harburg, tankage has been expanded to 9,531,000 cu. ft., or 1,700,000 bbl. Esso also has installed a modern laboratory.

Annual power consumption of the refinery totals 42,000,000 kwh., and annual cooling-water requirements are 226,300,000 bbl. Production from the refinery now chiefly comprises motor gasoline, diesel fuel, S.B.P. and white spirit, power kerosine, industrial lubricants, asphalt, and L.P.G.

Egypt Opens Area

Cities Service granted new 15,000-sq. mile concession

CITIES SERVICE CO. has obtained an exploratory concession over about 15,000 sq. miles of territory in Egypt.

The area lies between the Nile River and the Thirtieth Meridian and from the Twenty-eighth Parallel north to the Mediterranean. All of Egypt lying to the west of this area, the country's Western Desert, is in the 72,000-sq. mile concession acquired by Conorada Petroleum Corp. early this year.

The Cities Service concession was signed in Cairo by Raymond V. Whetzel, manager of the company's foreign department, and the Egyptian minister of commerce and industry. Terms of the agreement are understood to be the same as those obtained by Conorada, except that the minimum expenditure and work obligations are proportionally smaller *(The Oil and Gas Journal, February 15, page 106)*.

Cities Service is participating in the concession obtained by Conorada, and negotiations are now reported under way on an arrangement whereby the additional acreage obtained by Cities Service would be brought into the joint operation.

The Western Desert concession is being operated by a group consisting of Continental Oil Co., 27½ per cent; Ohio Oil Co., 27½ per cent; Cities Service, 22½ per cent, and Richfield Oil Corp., 22½ per cent. Conorada obtained the concession on behalf of its owners, Continental, Ohio, and Amerada Petroleum Corp. Amerada decided not to participate.

Formosa Refinery Expanding

Chinese Petroleum Corp. has contracted with Fluor Corp., Ltd., for engineering and construction of a Socony Type 45 Thermofor cat cracking unit for its refinery at Kaohsiung on the southwest coast of Formosa.

Charge stock for the unit, which will include a feed-preparation and gas-recovery system, will be 10,000 bbl. per day, from which 6,500 bbl. will be charged to the cat cracker.

Chinese Petroleum Corp. has been processing crude imported from the Middle East along with small amounts of indigenous crude. The new cat cracker is part of an extensive expansion program and is scheduled for completion by early 1955.

Creole Sees No Drop

Proudfit expects business in 1954 to match last year

DESPITE reduced consumption of heavy fuel oil in the United States, lower U. S. crude imports by some of its customers, and a loss of fuel oil outlet in the Eastern Hemisphere, Creole Petroleum Corp. expects its 1954 business will be substantially the same as in 1953.

Arthur T. Proudfit, Creole president, in his recent report to stockholders, said that the company's long-term growth would not be impaired by present conditions. To take advantage of its growth potential and meet competition, Creole is continuing a relatively high capital-investment program emphasizing quality of refined products, plant modernization, conservation facilities, and exploratory drilling. Capital expenditures in 1954 were estimated at $115,000,000, up 22 per cent. The heavy outlay is due largely to the Amuay refinery expansion and investment in conservation facilities.

Drilling program . . . Proudfit pointed out he previously had said the company had made known to the Venezuelan Government its views regarding the desirability of granting new oil concessions. While no action has yet been taken, Proudfit said the company understood the question is receiving the "closest study" from the Venezuelan Government. He said Creole is conducting an aggressive drilling program to the limit of its concessions, scheduling 136 exploratory wells this year against 61 field wells.

Discussing gas utilization, Proudfit said it was of interest to mention that the Venezuelan Government had announced in May that it would undertake to establish a petrochemical industry in the country to use natural gas not otherwise being used by the industry.

Proudfit pointed out that Venezuelan oil production actually decreased last year and said that, certainly, there has been no tendency for Venezuelan oil to "flood" the U. S. market.

Venezuela Output Rises

Venezuela's production in the first quarter of 1954 was 7.9 per cent higher than the same period last year and 3.1 per cent higher than the first 4 months of 1952, the record year.

During the first 4 months of this year, Venezuela produced an average of 1,879,734 bbl. daily compared with 1,743,044 bbl. daily in the first quarter of 1953 and 1,822,508 bbl. daily in the same period of 1952.

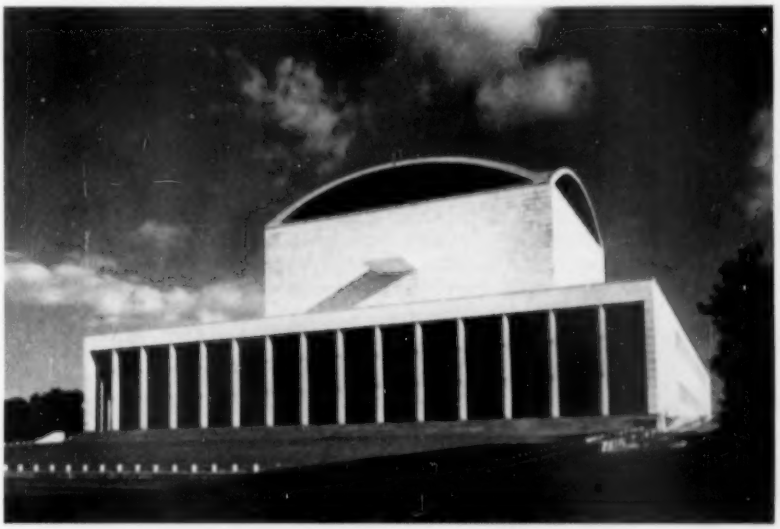
In spite of the good start for 1954, it is hardly an indication of a final production figure for the year. There is considerable fluctuation in demand for Venezuela fuel oil on the East Coast of the United States, in direct relation to seasonal temperatures. The low points in production come in August or September and the peaks in December.

Exchange Stymies Refinery

The problem of foreign exchange has arisen in connection with the proposal of McBride Oil & Gas Corp. to build a small refinery in British Guiana.

The colonial financial secretary announced recently in Georgetown that the company's application had not been yet granted because of the problem of sterling convertibility.

McBride plans to import Venezuelan crude pending the possible development of production in British Guiana itself, and the government has asked McBride the amount of hard currency required. At present, the colony imports the equivalent of about $3,100,000 of products annually from Trinidad. British Guiana authorities said the government was giving McBride full encouragement but that sterling convertibility was a big problem. McBride proposed a 3,500-bbl. daily refinery and, at the same time, asked rights to explore in a 2,096,000-acre area along the coast.



CONGRESS BUILDING of Rome's Universal Exhibition Center.

World Congress Plans Outlined

THIRTY-FOUR countries have accepted invitations to participate in the Fourth World Petroleum Congress scheduled June 6-15, 1955, in Rome.

The 9-day meeting will include sectional meetings covering a wide range of subjects, lectures by four speakers of international reputation, an official dinner, and tours to many of the petroleum and industrial areas of Italy. Most of the sessions during the congress will be held in the Congress building of Rome's Universal Exhibition Center.

Discussions during the congress have been divided into nine classifications. These include: geology and geophysics; drilling and production; oil processing; production of chemicals from petroleum; composition of petroleum, analysis and testing, measurement and control; utilization of oil products; materials, corrosion, and construction of equipment; transportation, storage, and distribution; and economics, statistics, education, and training.

The congress is sponsored by the Permanent Council of the World Petroleum Congress, which offices in London. Present members of the council include delegates from the United States, Great Britain, France, Austria, Belgium, Canada, Germany, Mexico, the Netherlands, Venezuela, and Italy. Dr. E. V. Murphree, president of Standard Oil Development Co., is council chairman.

The 1955 congress will be the second postwar congress. The last was held in 1951 at The Hague. The first congress was held in 1933 at London and the second in 1937 in Paris.

Firm Stages Comeback

Anglo-Iranian has nearly replaced refinery capacity lost at Abadan 3 years ago when Iran nationalized industry

COMPLETION of new refineries at Aden and West Australia will give Anglo-Iranian Oil Co., Ltd., a total refining capacity of 600,000 bbl. daily —only 40,000 bbl. daily less than the company had 3 years ago when it lost its properties in Iran.

The company's annual report documents the story of a steady recovery from the loss of its 500,000-bbl. refinery at Abadan when Anglo-Iranian lost 85 per cent of its refining capacity in one blow.

Last year, Anglo-Iranian's refining throughput rose to 20,000,000 tons or about 400,000 bbl. daily. By the end of next year, the Aden and Australian refineries are expected to boost this another 200,000 bbl. daily.

Production . . . Anglo-Iranian last year had a crude output of 32,000,000 tons or about 640,000 bbl. daily. This compares with 26,000,000 tons, or about 510,000 bbl. daily in 1952, 33,000,000 tons or 660,000 bbl. daily in 1951, and 42,000,000 tons, or 840,000 bbl. daily in 1950.

During 1953, Anglo-Iranian refining capacity in the United Kingdom rose to 9,327,000 tons from 6,788,000 tons in 1952. Much of this gain was due to the new 70,000 bbl. daily refinery at Kent.

Sir William Frazer, chairman, said work on the Aden refinery is ahead of schedule and that the facilities would come into operation this August. This is about 4 months in advance of expectations.

The Anglo-Iranian-Petrofina refinery at Antwerp processed 1,787,000, or about 36,000 bbl. daily. During the next 12 months capacity will be raised to 54,000 bbl. daily, and catalytic cracking and polymerization plants added.

Exploration . . . The Anglo-Iranian chairman reported that some indications of potential oil production had been obtained in the company's wildcat at Vittoria, Sicily. A site for drilling has been located on Mafia Island in Tanganyika, and drilling is to start soon in the Shell-Anglo-Iranian exploration program in East Africa. In Papua, another well is being drilled at Omati, and the northern delta area at Kuru, one of the most promising locations indicated by geological and geophysical surveys, is to be drilled soon.

Anglo-Iranian's capital expenditures were just under £75,000,000, the equivalent of $210,000,000, and included £56,100,000, or $157,000,000 for refinery construction at Aden, Kent, at other United Kingdom refineries, and at Kwinana in western Australia. Capital expenditures during the current year will be £60,000,000, or $168,000,000.

Elevated "Super Highway" for Coal

Three rubber conveying belts that will carry 225 tons of coal per hour will be supported on the gantry under construction in South Africa's gasoline-from-coal synthesis plant being constructed by the Kellogg International Corp. The conveying system is a vital link in the $89,000,000 plant being built about 40 miles south of Johannesburg for the South African Coal, Oil & Gas Corp., Ltd. The system will lift coal about 100 ft. from the mine to hopper. The coal will be processed to synthesis gas, which will be converted to liquid petroleum and a variety of byproducts. The plant is scheduled to go into production this year.

Oil Dumping Curbed

30 nations draw up rules for discharging oil at sea

AN international convention establishing zones in which the discharge of oil from tankers and other vessels will be prohibited has been adopted at a conference of maritime nations in London.

Delegates from 3 countries, including the United States and Soviet Russia, met in London at the request of the British Government. Public complaints against oil pollution of beaches in Britain and elsewhere in Europe have followed the postwar buildup in refining capacity in Europe and the expansion of the oil trade generally. Last year, a British Government committee investigated the problem of sea pollution and possible solutions. One of its recommendations was for action on an international level.

The convention which was unanimously adopted fixes a general limit of 50 miles from any coast as the zone within which oil cannot be discharged. Among the exceptions were the North Sea, where the limit is 100 miles, other than off Norway where the limit is 50 miles. In the Atlantic Ocean, the boundary was fixed at 30° West, Long., or between 800 and 900 miles west of Greenwich.

The conference passed eight resolutions. These urged that the complete avoidance of oil discharge in the sea be observed as soon as possible, that a further conference be held within 3 years, that oil-water separators be fitted to ships, that facilities for the reception of oil residues in ports be increased, and that the United Nations keep the problem under review. The convention provides that 3 years after it becomes effective following ratification by 10 countries, ships will have to carry oil record books listing any operations re-

sulting in oil discharge. It also allows inspection of these records in ports of countries other than those of the ship involved.

Iraq Attacks Price

Government wants to delete I.P.C. discount from pact

THE Iraq Government is seeking to eliminate the discounted sales price feature from its 1952 profit-sharing agreement with Iraq Petroleum Co., Ltd.

Discussions for readjustment of the oil sales price on which the profits division is calculated have already been initiated at the government's request. The issue was raised in April when H. S. Gibson, I.P.C.'s managing director, visited Baghdad and met with government officials.

Under the 1952 agreement, production costs are deducted from the proceeds of sales to arrive at profits. The sales price has by agreement been the actual sales price, and this with long-term and bulk sales involved, is less than the posted f.o.b. prices.

To arrive at a workable figure for the actual selling price, which varies with each cargo of oil, it was agreed that a fair representative deduction should be made to the company off the posted price. This was held to average 17s 6d a ton, and this discount is now in force. It is equivalent to slightly over 32 cents a barrel for Kirkuk-gravity crude.

Removal of the discount and calculation of the profits on the basis of the posted price, or some reduction of the discount, would obviously increase the government's revenue from the oil operation. A similar discount, or offtaker's price, was in effect for years in Saudi Arabia. Its elimination in Saudi Arabia apparently led to a similar request in Iraq. The Saudi Arabian discount, to shareholders in Arabian American Oil Co., amounted to 32 cents, or, before last summer's crude price increase, the difference between $1.43 and $1.75 a barrel.

Turkey Divides Areas

Turkey has been divided into nine areas for oil exploration under the petroleum law passed earlier this year.

Seven of the areas, the Sea of Marmara region, Ankara and vicinity, Siirt and vicinity, Gaziantep and vicinity, Adana and vicinity, Antalya and vicinity, and the Agean Sea region, are now open. Two other areas, from Sivas to the Black Sea and the eastern portion of the Erzurum area, are closed to commercial drilling and so is the northern portion of the Ordu region.

The closed areas take in the northeastern section of the country and include all territory bordering on Soviet Russia and Iran.

Three companies, Shell, Socony-Vacuum, and Caltex, have filed for nonexclusive exploratory permits pending publication of regulations for the new law.

West German Reserves Rise

West Germany's proved and probable reserves of crude oil amounted to 55,092,000 metric tons, or about 390,000,000 bbl., at the beginning of this year, according to official estimates.

Geologists of the oil companies working with the Office for Geological Research, Hanover, calculated that proved reserves of the republic totalled 40,867,000 tons, or about 290,000,000 bbl., while probable reserves came to 14,225,000 tons, or 100,000,000 bbl.

The aggregate reserves reflected an increase of 4,000,000 tons, or 28,400,000 bbl., over estimates a year ago. This buildup in reserves occurred despite production of 2,200,000 tons, or 15,600,000 bbl., in 1953. The total points up the successful exploratory and development work in West Germany during the past year, particularly in the area between the Weser and Ems rivers (where proved and probable reserves were given as 6,665,000 tons, or 50,500,000 bbl.) and in the Upper Rhine Valley.

Ceylon Refinery Studied

The possibility of still another new refinery in the Indian Ocean region of Southeast Asia has arisen with reports that Shell and Anglo-Iranian Oil Co., Ltd., are studying a plant in Ceylon.

In Colombo, the capital of this British Commonwealth dominion, F. D. Finn, general manager of the local Shell company, confirmed that exploratory talks on the subject were under way with the Ceylon prime minister, Sir. John Kotelawala. He said the project was being examined on behalf of both Shell and Anglo-Iranian and that if it materialized, as much Ceylonese capital as possible would be invited to participate.

International Briefs

A plant for the production of Epikote resins is being added to the Shell refining-petrochemical installation at Stanlow, Cheshire, England. First manufacture of these resins in Europe was undertaken a year ago by Shell at Pernis near Rotterdam in the Netherlands. The Stanlow plant, due to be completed next spring, will allow their first production in England. Epikote resins are made from diphenylolpropane and epichlorhydrin. They are used for finishes and in the electrical industry.

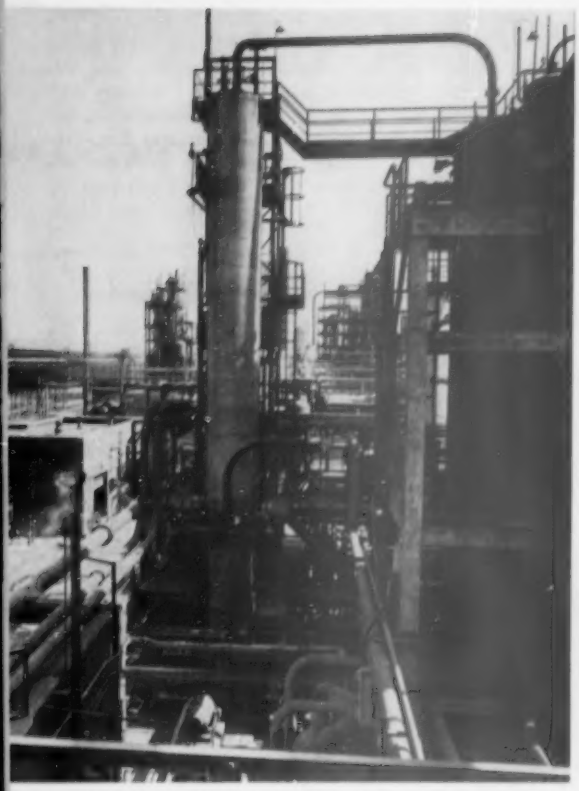
Cie. Financiere Belge des Petroles (Petrofina) has obtained an interest in Soc. Chimique des Derives du Petrole which is planning to build a chemical plant near the Soc. Industrielle Belge des Petrole refinery at Antwerp. The refinery, jointly owned by Anglo-Iranian Oil Co., Ltd., and Petrofina, last year processed more than 1,800,000 bbl., or 36,000 bbl. daily.

Standard-Vacuum Oil Co. has appointed M. Soediran Atmodjopitono as head of the company's installation at Tandjung Perak in Surabaja, Indonesia, according to an Indonesian Information Service report. It was said to be the first time a large foreign company had named an Indonesian to a top management position of this kind.

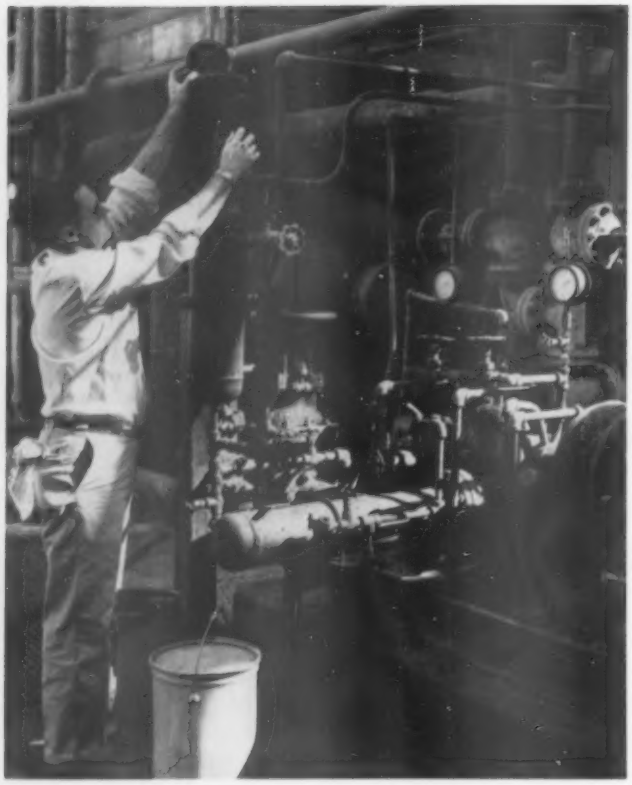
Soc. des Transports Petroliers par Pipe-Line (TRAPIL), in cooperation with other French companies, has been awarded a contract for the construction of a products pipe line in Egypt. The project involves a 90-mile fuel-oil line from Suez to Cairo and is being carried out by the Egyptian Government. TRAPIL is a French company which built and now operates the products pipeline from Le Havre to Paris. The company also is representing the French Government in connection with certain military pipelines now being built in France.

The British steel firm of Stewarts & Lloyds has won an order to supply 16-in. seamless pipe for the 350-mile Sui-Karachi gas transmission pipe line. The order amounts to around £2,000,000 ($5,600,000). Shipments of pipe to Karachi are expected to be made from England in the near future.

A location about ¾ mile northeast of Joppolo near Aragona in Sicily has been selected by Mediterranean Oil Co. for its first test. The rig now drilling Ragusa 2 for American International Fuel & Petroleum Co. (Gulf) will be moved to drill the Mediterranean Oil test, probably beginning the latter part of July. Mediterranean Oil is a Gulf and Macmillan Petroleum Corp. subsidiary.



ACID-GAS ABSORPTION UNIT of Pan American Refining Corp., Texas City, Tex., uses silicone defoamer in DEA solution.



A 1-QT. ADDITION of antifoam agent is made about every 3 weeks in the 2,000-bbl. circulating DEA solution in Pan American's acid-gas unit.

SILICONES—New Tools for Petroleum Operations

. . . They make many refining jobs easier, simpler

by F. Lawrence Rosen
Gulf Coast District Editor

DURING the past 10 years silicones have proved of great value in a number of refining applications. Among the earliest is the use of a silicone fluid at a concentration of only a few parts per million as a defoamer additive for lube oils.

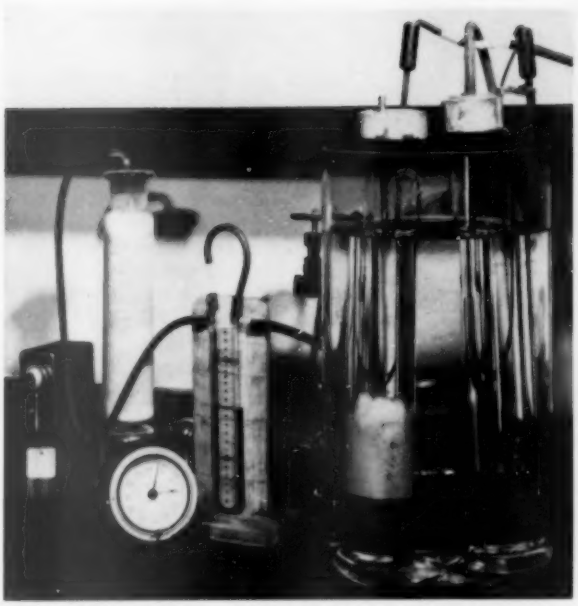
More versatile silicone defoamers in emulsion form have been used in the processing of greases and asphalt, and there are reports of the use of these products to increase throughput in other processing units where internal foaming is a problem.

Other silicone products including special-purpose lubricants, high-temperature gaskets, seals, and cable fabricated of silicone rubber are still on a semi-experimental basis in refinery service.

Such silicone products as heat and weather-resistant paints and heat-stable insulating materials for electric motors have definitely established their usefulness in all fields of industry including refinery service. Some typical field reports that illustrate the usefulness of various silicone products in processing plants are summarized in the following paragraphs:

Gas absorption . . . At Pan American Refining Corp.'s Texas City, Tex., refinery silicone defoamer is used in the acid-gas absorption unit. This unit was designed to remove acid gases, predominantly hydrogen sulfide and carbon dioxide, from a propane-propylene gas stream. This stream is the feed to the catalytic polymerization unit at the plant.

The absorption unit is composed essentially of an absorber tower and a reactivator, together with accompanying pumps, drums, and other auxiliary equipment. The acid gases are absorbed from the feed gas with a countercurrent solution of 15 per cent diethanolamine (DEA). The DEA rich in acid gas is



SILICONE DEFOAMING PROPERTIES are illustrated in these tests at laboratories of Sinclair Refining Co. At left is uninhibited crankcase oil, and at right is oil sample containing 0.001 silicone fluid.

SILICONE MOLD-RELEASE compound is used by Co-op refinery at Coffeyville, Kans., in production of micro-crystalline wax. It is otherwise difficult to remove the wax from the mold, since it has excellent adhering properties.

sent to the reactivator tower where acid gases are driven off with heat. The lean DEA stream is then cooled and returned to the absorber tower for further absorption duty.

Injection of the defoamer is made at the suction of the lean DEA pump. This is accomplished by injecting the antifoam agent through a funnel into a small, depressured vessel. The vessel is then closed off to the atmosphere and a lean DEA slip stream is used to flush the antifoam agent out of the vessel into the suction of the lean DEA pump. The defoamer is added when foaming tendencies are indicated by a fluctuating lean DEA flow. A 1-qt. addition of antifoam agent is made approximately once every 3 weeks into the 200-bbl. circulating DEA solution.

Lube oils . . . In determining the foam formation of their lubricating oils, Sinclair Refining Laboratories employ the method described in A.S.T.M. D-892-46T. This process, which is also covered in Military Specification VV-L-971D, consists of passing dried air under pressure for 5 minutes into 200 mm. of oil held at a given temperature. Air is then shut off and the resulting foam is left undisturbed for 10 minutes, after which its height is measured.

Permissible heights of foam still standing vary for different oils, ranging from 60 mm. to as much as 400 mm. To pass the test, however, many oils require an added inhibitor. The most effective of these, according to Sinclair engineers, is silicone fluid. So efficient that its concentration ranges from 0.001 to 0.0001 per cent, it has no effect on any performance characteristic of the oil except foaming.

Foam inhibition not only affects the performance of lubricating oils, but also their processing. Blending tanks which formerly had to be filled either extremely slowly or only part way because of thick blankets of highly inflammable foam can now be rapidly filled to maximum capacity with only scattered traces of foam.

Wax molding . . . A special wax mold is used at the Sinclair labs for making sample orders of special formulations. Machined of heavy cast aluminum, the laboratory mold features brass inserts, front and back, which imprint the Sinclair insigne and trade mark on the finished slab of wax.

The inserts are about ¼ in. deep and somewhat complex and often caused serious sticking even though the mold is designed to be easily opened for maximum ease of release. Several release agents were tested, including castor oil in solvent, but all of them either deteriorated rapidly at molding temperatures or contaminated the wax—or both.

Silicone compound was first tried about 3 years ago, and has been used with success ever since. A small amount is rubbed into the inserts and mold walls with a cloth before each pouring. The wax slabs release easily and cleanly without difficulty and the mold is easily cleaned. Additionally, there has never been any indication of contamination.

A similar experience, but on a commercial scale, has been the case at the Cooperative Refinery Association, Coffeyville, Kans., where a high-grade microcrystalline wax is produced and then slabbed into 10-lb. cakes in conventional wax presses. The wax is a highly ductile material with excellent adhering characteristics, making it almost impossible to remove the cakes from the wax press without the aid of a mold release agent.

Various soap compounds and detergents were first tried on an experimental basis without success. Increasing the temperature of the press after the wax solidified proved a time-consuming procedure and the slabs could not be handled without deformation.

This problem was solved by applying a thin coating of silicone mold release compound to the press. This inert, odorless, grease-like material compounded from silicone fluids is applied to the metal surfaces of the press by wiping them with a cloth saturated with the compound. Only a very thin film is applied because an excessive application is wasteful and leaves the finished wax cake with an undesirably slick finish.

Co-op's experience has been that a wax press treated in this manner need not be recoated for long periods of time. Over 40,000 lb. of microcrystal-

line wax has been slabbed in a press of 2,000-lb. capacity with only an occasional and partial application of the mold release agent to a few spots where sticking occurred.

Defoamer . . . An unusual application has been made at Southwestern Oil & Refining Co.'s Corpus Christi plant, where a defoamer is injected into the vacuum-distillation unit. A silicone defoamer in emulsion form is used to reduce the ash content of No. 4 oil and vacuum gas-oil cuts taken from the unit.

The defoamer is injected into the suction of the atmospheric flash tower charge. During trial runs, 2 p.p.m. following an initial concentration of 4 p.p.m. of the defoamer resulted in reductions of as much as 75 per cent of the original ash content.

Electrical insulation . . . Limitations in unit capacities are often imposed by the horsepower of the prime movers of pumps, blowers, etc., in critical flow lines. Where these prime movers are electric motors, capacity can be increased by rewinding the motor with silicone (Class H) insulating materials.

For example, one of the charge pumps in a 41,500-bbl. combination unit at Magnolia Petroleum Co.'s Beaumont, Tex., refinery is driven by a 500-hp. electric motor. Even though the motor is equipped with a heat exchanger for cooling purposes, high ambient temperatures, continuous operation, and overloads caused rapid deterioration of the insulation leading to motor failure on an average of once every other year. Rewinding cost about $1,750 and required a minimum of 7 days.

Over 2 years ago, this motor was rewound with silicone insulation to increase its capacity from 500 to 650 hp. Its performance and efficiency have been so satisfactory that Magnolia is planning to increase the capacity of another pump in this unit from 700 to 850 hp. by rewinding with Class H materials.

Similarly, in another major Gulf Coast refinery, the capacity of a drive motor on a pebble mill for grinding paint pigments was increased from 7½ hp. to 15 hp. by rewinding the motor with Class H insulating materials. Originally rated at 7½ hp., 900 r.p.m., this T.E.F.C. motor operated at 22.4 amp. with a 55° C. rise.

It now delivers 15 hp. at 900 r.p.m. with an input of 44 amp. and a temperature rise of 75° C. Silicone (Class H) insulation is frequently used to increase the capacity of conventional motors by 50 per cent. In this case, it has enabled the motor to deliver twice its original rated capacity for over 2 years with no sign of difficulty.

Such performance is made possible by exceptional heat stability and moisture resistance of the silicone resins and varnishes used to bond and impregnate inorganic insulating materials including fibrous glass cloth, mica, and asbestos. Such Class H insulating materials have a temperature advantage of about 50° C. over Class B insulation or 75° C. over Class A as rated by A.I.E.E.

This temperature advantage is used either to increase by a factor of 10 the life and reliability of electrical equipment, or to increase by at least 50 per cent the power per pound ratio in electric machines.

Protective coatings . . . The heat sta-

What Silicones Are—How They're Made . . .

SILICONE compounds were first studied and named by Prof. F. S. Kipping, University of Nottingham, England, when he obtained lower polymeric materials upon the hydrolysis of disubstituted silicon dichloride.

Although his work with the organo-silicon compounds from 1899-1935 served as a foundation for the silicones of today, no useful products came of Kipping's academic researches until research chemists at Corning Glass Works and at Mellon Institute of Industrial Research developed the high polymeric silicone products now reconciled as a new class of engineering materials.

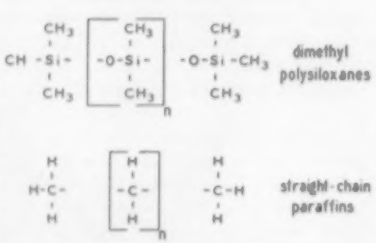
Industrially speaking, then, the silicones are newcomers to the chemical world, being first commercially produced in 1943 by Dow Corning Corp., specifically formed for this purpose.

Structures . . . Chemically speaking, the compounds are a cross between organics and inorganics, deriving many of their useful properties from the molecular skeleton of silicon-oxygen linkages which they possess in common with such inorganic materials as glass and mineral silicates.

Structurally, the silicones may be compared to hydrocarbons, except that silicones are built on a molecular structure of alternate silicon and oxygen atoms, while the hydrocarbons are built on carbon-to-carbon links. An interesting and significant point is that the bond energy of the Si–O linkage is 1½ times as great as the C–C linkage, with the Si–C linkage being strong and relatively heat stable, especially with a small hydrocarbon group such as methyl.

Simplest of the silicone structures are the dimethyl polysiloxanes, which have dimethyl siloxane units, $(CH_3)_2Si–O$, linked together to form chains of varying lengths. These are quite similar to straight-chain paraffinic hydrocarbons which are characterized by a $–CH_2–$ building unit.

Both these silicones and hydrocarbons are fluids, with the average length of the chain determining the fluid viscosity. However, the silicone fluids are inherently much more heat-stable and oxidation resistant with a remarkably flat viscosity-temperature slope.



More complex synthesis will result in resins whose structures are analogous to inorganic glasses. The solubilities and other properties of the resins may be widely varied at different control points in the synthesis, such as the choice of substituent R-groups, condensation method, and use of catalyst, and in the curing conditions. The elastomeric silicones may be considered as compromises between fluids and resins, being long linear structures with a mild degree of controlled crosslinking. Thus, starting with the intermediate chlorides, a range of products from fluids to resins to rubbers, with varying properties may be obtained under controlled conditions.

Synthesis . . . In the synthesis of silicones, several methods may be used to produce the intermediate organosilicon halides. The classical Grignard method may be followed.

bility of silicone resins is also demonstrated in a wide variety of silicone-based paints and enamels. Protective coatings made with straight or modified silicone resins are characterized by high heat-stability and weather resistance.

At Cit-Con Oil Corp.'s lube-oil plant near Lake Charles, La., black paint is used to protect large surface areas on petrochem furnaces and exhaust stacks. The plant was originally (1949) scheduled for unit shutdowns once a year for cleaning and refinishing. It soon became evident, however, that the most heat-resistant organic finishes available could not last a full year in service.

Rust stains appeared on all of the stacks in a matter of months. Deterioration of the organic finishes was most rapid and pronounced, of course, on the three heaters where gas temperature in the range of 900° to 950° F. were measured just above the breech.

When the steam boiler unit was shut down in July 1952, the three 100-ft. stacks were wire-brushed and coated, top to bottom, with a brushed-on coating of a silicone-based black paint. The coating was allowed to air dry and then cured in service. In September of that year, all of the petrochem heater stacks were similarly refinished. Today all but one of the stacks in that plant have been coated with silicone paint.

Despite high surface temperatures, weather and corrosive atmospheres, the silicone paint has retained its film continuity and gloss for long periods of time. In many cases it has served to eliminate yearly refinishing costs, with shutdowns taking without the need for refinishing the stacks and other silicone-painted surfaces.

Residuals . . . At Shell Oil Co.'s Houston refinery, silicone fluid is being used to reduce foaming of No. 6 fuel oil.

In plant operations, residual fuel oil from various units is piped into intermediate rundown tanks prior to being transferred to final storage. The residuals are obtained primarily from thermal cracking operations and are adjusted to No. 6 fuel specifications in these tanks.

Prior to the addition of silicone fluid, it was found that foaming occasionally occurred when the fuel oil was pumped from storage into tankers or barges.

Laboratory tests were conducted by Shell using a silicone dimethyl polysiloxane fluid of 200 cs. viscosity. These tests showed that when a 150-ml. sample of untreated No. 6 fuel oil was aerated, foaming would occur to increase its volume to 250 ml. in 14 seconds. When the sample was treated with 0.2 p.p.m. of silicone fluid, it took 2 minutes to increase its volume to 190 ml. maximum. It was determined that this concentration would economically and satisfactorily reduce the foaming of fuel oil when being loaded aboard ship or barges.

A variable injection pump was installed to pump silicone fluid from a small storage drum to the discharge line of the transfer pump moving oil from the rundown tanks to final storage.

Acknowledgments

Cooperation of the management of Dow Corning Corp., Midland, Mich., and Max Leavenworth, Southwest branch manager, Dallas, and Ted Goldmann, Houston representative, in the compilation of the field reports for this series is gratefully acknowledged.

$$R_3SiCl \xrightarrow[-HCl]{+H_2O} R_3SiOH \xrightarrow{\text{condensation}} \underset{R}{\overset{R}{R}}SiO- \quad \text{Fluids (disiloxanes)}$$

(monofunctional) (end groups)

$$R_2SiCl_2 \xrightarrow[-2HCl]{+2H_2O} R_2Si(OH)_2 \xrightarrow{\text{condensation}} \underset{R}{\overset{R}{O}}SiO \quad \text{Fluids (rubber resins)}$$

(difunctional) (chain unit)

$$RSiCl_3 \xrightarrow[-3HCl]{+3H_2O} RSi(OH)_3 \xrightarrow{\text{condensation}} \underset{O}{\overset{R}{O}}SiO- \quad \text{Resins}$$

(trifunctional) (crosslinked)

This was the first one in large-scale production. In Method 2, organic halides are added directly to silicon metal. In the third method, silicon halides and hydrocarbons are caused to unite directly at high temperatures.

1. Silicon halide + Grignard reagent ⟶ organosilicon halide.

2. Silicon metal (catalyzed) + organic halide $\xrightarrow[°C.]{200\text{-}500}$ organosilicon halide.

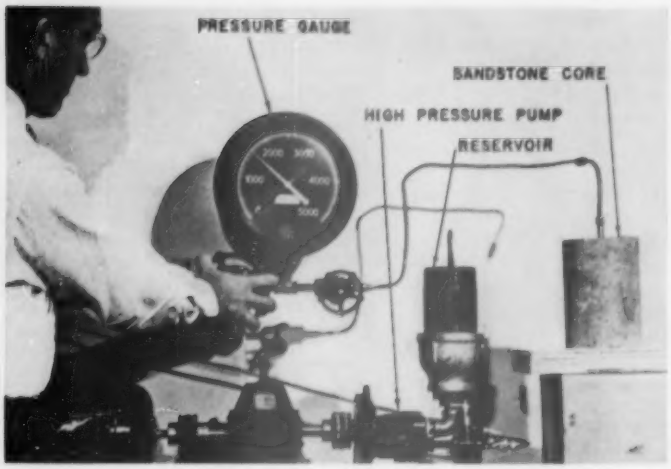
The initial step in the Grignard method is the conversion of sand (silica) to silicon tetrachloride by heating with coke and chlorine from brine. This conversion from silica to the tetrachloride provides a simple molecule to which organic hydrocarbon groups may be attached by replacing one or more chlorine atoms. This is accomplished by first producing organic chlorides (RCl) from a reaction of hydrocarbons and chlorine.

The chlorides are treated with magnesium metal to form the Grignard reagent which is then reacted with the silicon tetrachloride, wherein one chlorine atom is replaced by a hydrocarbon group (R) whose chlorine atom joins with the other and magnesium to form magnesium chloride which originally occurs in the brine. Successive replacements may be made in this manner to yield a series of organosilicon chlorides with $RSiCl_3$ and R_2SiCl_2 being the most significant in further synthesis.

The organosilicon chlorides are hydrolyzed to intermediate Si–OH compounds termed silanols, which are condensed to the various silicones.

Generally speaking, the silicone fluids, compounds, greases, resins, and rubber obtained by such synthesis and formulations are typified by a high degree of stability. This very remarkable stability to withstand change under temperature extremes, under wetting conditions, and on exposure to a wide variety of difficult service conditions has contributed to their increased usage and growth.

This basic property of stability is demonstrated in the fluids by their flat viscosity-temperature curves, and by their ability to form a durably water-repellent surface. In the resins, that stability is demonstrated in protective coatings that withstand temperatures up to 1,000° F. and in electrical insulating varnishes that make it possible to increase the capacity of electric motors by 50 per cent or increase service life by a factor of 10. In the rubber, stability is demonstrated by a retention of rubbery properties at temperatures ranging from minus 100° to plus 500° F. after years of weathering.



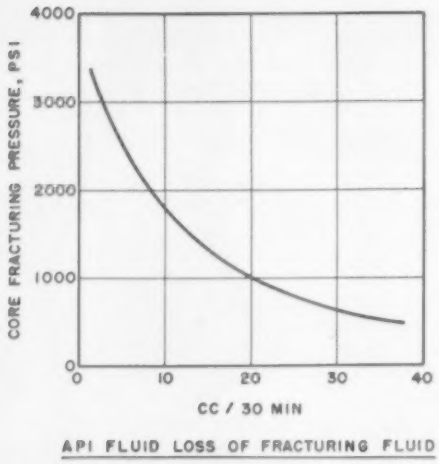


Fig. 1—Effect of fluid loss on fracturing pressure of sandstone cores. View at left shows laboratory test apparatus.

Multiple Fractures Can Increase Recovery

. . . and so can deeper fractures

by C. R. Fast

HERE are two recent developments that promise increased oil recovery in some problem reservoirs:

- **Multiple fracturing.** To date, the multiple-fracturing process has been used in approximately 450 wells. Of these, about 400 have responded with sustained production increases. Average oil production increase has been 240 per cent.
- **Deeper fracturing.** Commercial recovery may be obtained from extremely low-permeability formations by creating deeply penetrating fractures, provided there is adequate oil in place and sufficient gas in solution as a source of energy.

The field application of the original single-fracture hydraulic fracturing process indicated that, in some instances, it was impracticable to treat a given well due to the inability to isolate properly that portion of the producing formation to be treated. This shortcoming, plus the need for a method that would create more than one fracture on a single hydraulic fracturing job, indicated the need for a multiple fracturing process.

A study of the flow characteristics of the fracturing fluid and the rupture phenomena of rock formations has shown that both the fracturing fluid viscosity and its ability to penetrate a formation are important considerations in fracturing a formation.

This paper, the accompanying one by D. E. Shupp, and the two papers by E. H. Timmerman and R. C. Clark which will appear in an early issue comprise a Symposium on Hydraulic Fracturing. This symposium was held under the auspices of the Mid-Continent section of the A.I.M.E., Ponca City, Okla., December 14, 1953, and the papers are presented here by courtesy of the companies represented.

The penetration of the treating fluid into the pores of the formation seems to act somewhat as a "hydraulic wedge," so that in a given section of open hole, where rock strength is uniform, if hydraulic pressure is applied to the bore, failure first occurs where there is greatest penetration of the hydraulic fluid into the rock pores. Conversely, it has been observed that when the fracturing fluid is confined to the well bore, much higher fracturing pressures are required.

The effect of penetration of fracturing fluid into rock on formation fracturing pressure is illustrated on Fig. 1. These data were collected from a series of tests where rock samples were fractured with various types of fracturing fluids. In general, it may be observed that fracturing pressure decreases as fluid penetration is increased.

The data in Fig. 1 led to the development of a multiple fracturing technique wherein a single fracture is created and then plugged at its face on the well wall by introducing into the fracturing fluid a suitable plugging material to prevent further penetration of the fracturing fluid into the crack.

By so restricting the fracturing fluid to the well bore, it is then possible to increase the hydraulic pressure in the hole to some higher value, at which another fracture occurs at some other elevation where the fluid seal on the well bore is not so complete, or where the rock is markedly weaker than at other depths. Each fracture so formed is extended with a viscous liquid containing no plugging material.

Thus, by repeating this procedure, i.e., sealing successively formed fractures with a suitable material which allows the imposition of sufficient pressure to fracture other portions of the formation, it is possible to create multiple fractures in any one isolated section of the well.

From our study of rock rupture it became evident that the two key factors on which the success of a multiple fracturing method would depend are: (1) the effective sealing of the previously formed fractures with a plugging agent sufficiently strong to allow the imposition of much higher pressures at other sections of the forma-

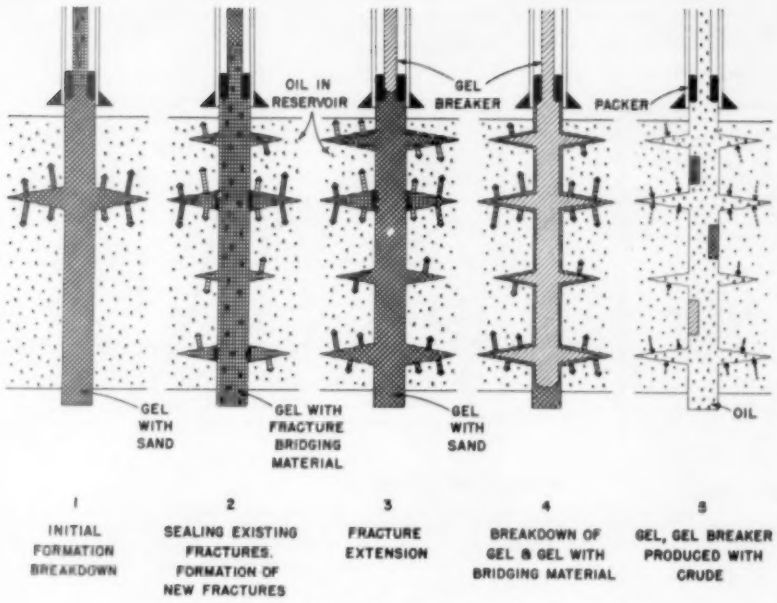


Fig. 2—Multiple hydraulic fracturing method. (Multifrac).

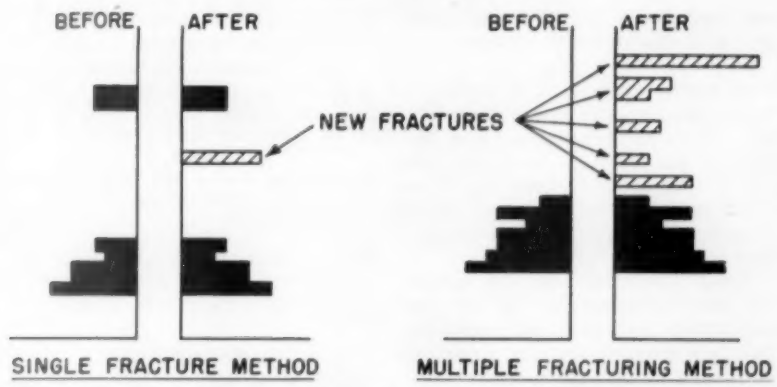


Fig. 3—Profile of permeable zones before and after typical hydraulic fracturing treatments.

tion being treated; and (2) the removal of the plugging agent at the completion of the treating operation to allow free flow of the formation fluid into the well through all of the fractures created.

Material requirements . . . Among the materials used at the present time which meet both of these requirements are compressed and ground pellets of naphthalene of a selected particle-size distribution, which are completely soluble in crude oil after a predetermined length of time.

The low penetrating fluid, such as napalm gel, used as the fracturing fluid for this hydraulic fracturing process in sandstone, and the thickened acid used as the fracturing fluid for the hydraulic process in carbonate rocks both have proved satisfactory as transporting media for the temporary plugging material used in this fracturing method. This allows the multiple-fracturing method to be adaptable to all types of producing formations.

Outline of process . . . Multiple fracturing is a method of creating more than one fracture in a formation during a single treatment. Fig. 2 shows the procedure involved in a multiple-fracturing treatment. The first step involves initially fracturing the formation and extending this fracture the desired distance into the formation. The second step consists of plugging the initial fracture with a thickened oil or acid containing a suitable temporarily solid plugging material.

The extension of additional fractures with a fracturing fluid containing no bridging materials is shown as Step 3 while Step 4 shows the reduction in viscosity of the fracturing fluid. The fifth step of this treating procedure consists merely of placing the well back on production to flush the treating fluids from the formation.

This treatment may be repeated as many times as is dictated by the characteristics of the formation.

Applying the process . . . This type of treatment is particularly applicable to wells having long, nonuniform producing formations which require a multiple fracture system to drain them effectively. It is not possible, in many formations of this type, to isolate small portions of the producing formation, for example, by the use of packers, to accomplish multiple fracturing.

To date, this method of hydraulic fracturing has been used in approximately 450 wells. Of these, approximately 400 have responded with sustained production increases. A typical treatment of this method has resulted in an average oil-production increase of 240 per cent.

Fig. 3 presents the results of two typical well surveys conducted to determine the location of the more permeable zones of a producing formation before and after both single-fracture and multiple-fracturing treatments. These surveys were conducted by injecting oil into the producing formation and measuring the amount of fluid being displaced into each zone. The profile on the left shows the one fracture created by the single-fracture method of the hydraulic-fracturing process. The profile on the right illustrates the results of the multiple-batch multiple-fracture method in which five new fractures were made. These fractures were, incidentally, interpreted as being horizontal—although we have encountered ample evidence to indicate that both vertical and horizontal fractures are created in deep wells.

Recovery from Low-Permeability Formations

Where there is adequate oil in place and sufficient gas in solution as a source of energy, commercial recovery

THE AUTHOR

C. R. Fast, technical group supervisor, Stanolind Oil & Gas Co.'s research department, is a native of Tulsa. He graduated from University of Tulsa in 1943 with a B.S. degree in petroleum production engineering. Fast joined Stanolind the same year as an apprentice engineer in the company's production research department. He was made technical group supervisor last year.

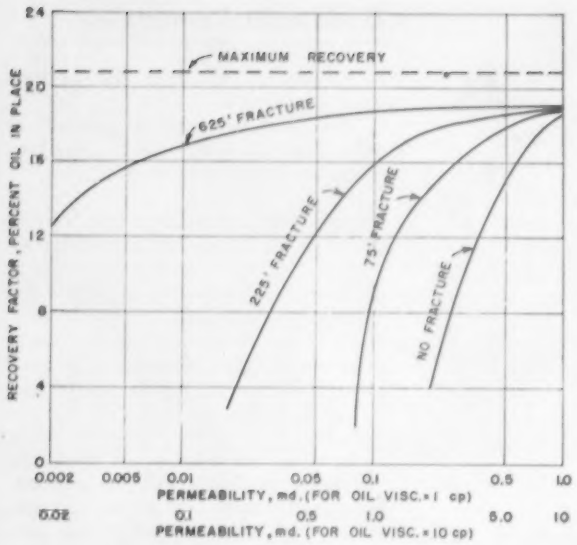
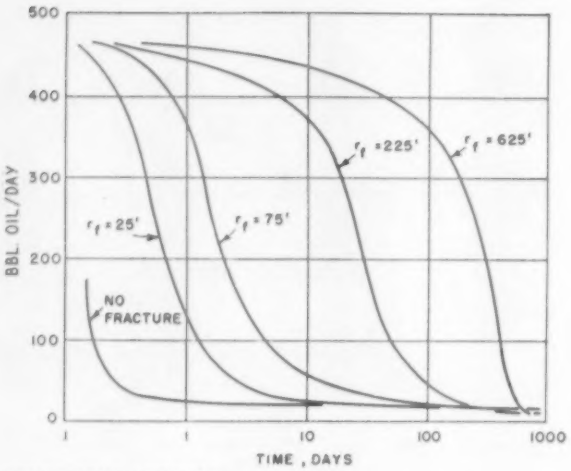

MAXIMUM RECOVERY
625' FRACTURE
225' FRACTURE
75' FRACTURE
NO FRACTURE
RECOVERY FACTOR, PERCENT OIL IN PLACE
PERMEABILITY, md. (FOR OIL VISC. = 1 cp)
PERMEABILITY, md. (FOR OIL VISC. = 10 cp)

Fig. 4—Effect of formation permeability on ultimate recovery.



CONDITIONS ASSUMED:

Formation permeability	0.2 md.	Fracture flow capacity 30 md. ft.
Formation thickness	30 ft.	Back pressure at sand face 100 psi.
Oil in place	12,000 bbl./acre	40-acre well spacing
Initial pressure	1,700 psi.	

Fig. 5—Effect of fracture radius on production.

Hydraulic Fracturing

may be obtained from extremely low-permeability formations by creating deeply penetrating fractures.

To investigate recoveries from low-permeability formations, calculations for several hypothetical reservoirs were made. Fig. 4 shows a plot of formation permeability versus recovery factor, presenting the results of those analytical studies which show that substantial recovery is obtainable from extremely low-permeability formations provided a deep fracture is created.

Additional analytical calculations were made to determine the rate of production resulting from the creation of a deep fracture. The results of these calculations are presented on Fig. 5 which is a plot of producing rate versus time on a logarithmic scale. In these calculations the formation permeability was assumed equal to 0.2 md., the formation thickness 30 ft., oil in place 12,000 bbl. per acre, initial pressure 1,700 psi., fracture flow capacity 30 md.-ft., and a 40-acre well spacing. It was assumed that a 100-psi. back pressure was held against the sand face.

This plot shows that higher rates of production could be maintained for a much longer time when deeper fractures are made. In making these calculations, it was observed that the higher rates of production could be maintained until essentially all of the recoverable oil was produced from the reservoir flanking the fractures. It may be seen that **the deeper the fracture, the higher will be the ultimate recovery, and, furthermore, the oil can be recovered in a shorter length of time.**

Field results verify . . . A review of field experience with large volume fracture treatments in extremely tight formations has revealed that data are available on some 22 fracturing treatments conducted in the Annona chalk formation of Pine Island, Louisiana, field.

These treatments may be divided into two categories; that is, new well completions and old well workovers. Data are available on nine repairs of old wells utilizing large-volume viscous-oil fracturing treatments. Of these nine treatments, all have been successful in stimulating well production. Table 1 presents data on the quantities of sand and fracturing fluid used and the average injection rate during treatment.

Thirteen new wells in Pine Island field was completed with large-volume fracturing treatments, and each of these treatments was very successful in stimulating oil production. These wells were completed in two to four chalk zones. Table 2 presents data pertinent to these treatments. As yet no definite data are available on the optimum quantities of fracturing fluid and sand for this area.

Table 3 presents the results obtained in an average hydraulic fracturing workover job in Pine Island field.

TABLE 3

Results of an Average Pine Island Fracturing Workover Job

	Typical prod. rate
Before treatment, bbl. oil per day	6
After treatment, bbl. oil per day	47
4.5 months after treament, bbl. oil per day	16

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TABLE 1—OLD WELL WORKOVERS (NINE TREATMENTS)

	Viscous oil (gal.)	Sand (lb.)	Injection rate (bbl. per minute)
Average	14,000	24,000	5.8
Maximum	21,800	42,000	10.0
Minimum	8,400	6,300	1.5

TABLE 2—NEW WELL COMPLETIONS (13 TREATMENTS)

	Viscous oil, gal.		Sand, lb.		Injection
	Well	Zone	Well	Zone	rate per zone
Average	23,400	8,000	57,000	19,500	5.9
Minimum	11,400	4,500	15,000	7,600	3.7
Maximum	36,000	12,000	84,000	40,000	9.6

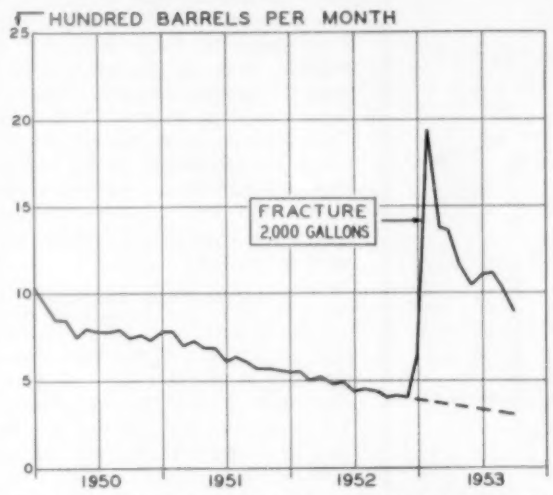


Fig. 1—Oil-production history of Well A, Gibson sand, Katie pool.

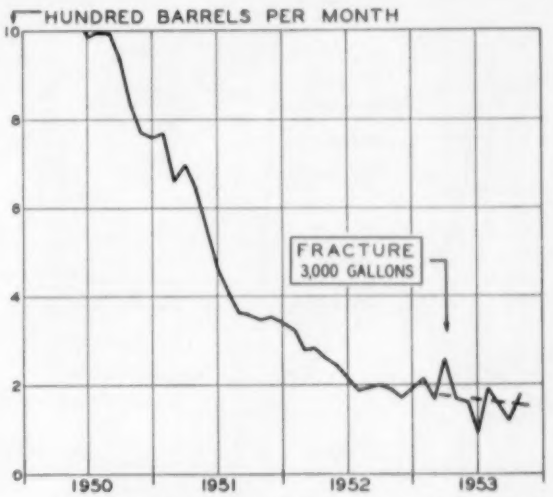


Fig. 2—Oil-production history of Well B, Gibson sand, Katie pool.

Three Oklahoma Fracturing Jobs

. . . and how they fared

by D. E. Shupp

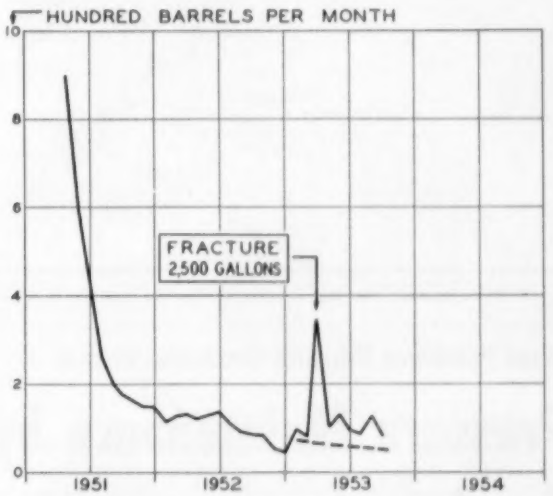


Fig. 3—Oil-production history of Well C, Springer sand, Knox pool.

TO establish some of the characteristics that might forecast the results of a proposed formation-fracturing job, an example has been chosen for study of an obviously successful treatment, a totally unsuccessful one, and one in which a production gain was achieved but not sustained.

Wells A and B produce from the Pennsylvanian Gibson sand of the Golden Trend Katie pool, while well C is a Pennsylvanian Springer sand producer in the Knox pool, Grady County, Oklahoma. All three wells were fractured several years after completion, and the production histories are shown in Figs. 1, 2, and 3. In addition, the untreated histories have been projected as dashed curves from the time of fracturing to illustrate the production gains. None of the wells produced water before or after treatment.

Author is with Carter Oil Co., Oklahoma City.

• **Well A . . .** Treatment of this well resulted in a pronounced and apparently sustained production increase as Fig. 1 shows. Immediately prior to treatment the well was flowing an average of 13 bbl. of oil per day. After fracturing with 2,000 gal., well A flowed an average of 74 bbl. of oil per day for 10 days. Production since has been at capacity and is currently 22 bbl. of oil per day.

Well A had continuously exhibited a low gas-oil ratio, indicative of high remaining oil saturation and reserves consistent with a dissolved-gas drive known to be the principal recovery agent in the field. The decline rate was also flat, which coupled with the low producing rate and other information denoted restricted permeability.

Correspondingly, treatment was successful.

• **Well B . . .** The treatment of well B was a failure, resulting in no over-all production gain after fracturing with 3,000 gal. as shown in Fig. 2. This well had been producing on a steep decline rate and the gas-oil ratio had increased to a high value, indicating that the well had already been essentially depleted of its recoverable reserves, confirmed by the absence of results from the fracturing.

• **Well C . . .** An in-between case is shown in Fig. 3, which presents the re-

(Continued on page 89)

Fig. 1—Place-fix map showing location of Opelika field in Henderson County, East Texas.

Texas Petroleum Research Committee Report:

Pressure Maintenance by Gas Injection . . . in Opelika field of Henderson County, Texas

by T. W. Clay

OPELIKA field, although similar in most respects to other relatively deep Glen Rose limestone reservoirs in the East Texas area, is unique in that a gas-injection program has been in operation since shortly after the field's discovery.

To date, the gas-injection program appears to be a success in that producing capacities have been maintained in most areas of the field, artificial-lift equipment has been necessary on only a few wells, and the recovery of both oil and condensate has exceeded estimated values by primary depletion.

Author is with Lone Star Producing Co., Dallas. Paper presented at Texas Petroleum Research Committee Symposium, Tyler, May 7, 1954.

Opelika field is one of a number of multireservoir fields producing from the Glen Rose limestone in the East Texas area. The field is located in the northeast part of Henderson County along the Van Zandt County line. Geologically the field is situated a few miles west of the axis of the East Texas geosyncline on a distinct structural feature. Location with respect to other fields in the area is shown in Fig. 1. The field is on a relatively large, faulted domal-type structure with oil and gas accumulations being found on the north or upthrown side of the principal fault.

Gas production currently is being obtained from three formations: the Travis Peak sand, the Pettit lime, and the Rodessa lime. Oil is being obtained from the Rodessa zone only. Two other formations, a stray lime in the upper Glen Rose and the James lime produced small quantities of oil and gas, respectively; however, production from these zones was noncommercial and both were abandoned after relatively short periods.

Production From Two Zones

The Rodessa zone, which produces both oil and gas in the main part of the field is also gas productive in a small fault block of the main reservoir. The name Peacock reservoir has been used to distinguish this pool from the main Rodessa reservoir. Fig. 2 is a structural map of the field contoured on top of the Rodessa "H" porosity.

The Rodessa is composed of several permeable zones but essentially all of the production has been obtained from two zones which have been termed the "F" and "H" porosities. The "F" porosity is fairly uniform in thickness throughout the field with the permeable section varying from approximately 2 to 10 ft. and averaging approximately 6 ft. This zone is composed of a soft granular lime with porosity and permeability varying from poor to fair. Average porosity of the "F" zone as determined from analyses of cores from 11 wells to 12.7 per cent.

The "H" porosity is composed primarily of a clastic, coquina-type limestone with poor to good porosity and permeability. Analyses of the cores from 12 wells indicate this zone to have an average porosity of 16.5 per cent and an average permeability of 59 md. The effective thickness of the "H" porosity varies from 0 to 30 ft., and averages approximately 14 ft. Generally, the zone is much thicker in the gas cap and shows considerable thinning downdip. The electric-log characteristics of the Rodessa zone in a typical gas-cap well and a typical oil-zone well are shown in Fig. 3.

Discovery in 1937 . . . Opelika field was discovered during 1937, with the completion of the Tide Water, Seaboard, and Humble 1 McElreath & Suggett as a relatively small-volume oil well producing from a stray limestone in the upper Glen Rose. These operators immediately commenced the drilling of the 2 McElreath & Suggett which was completed during the same year as a Rodessa gas well.

During 1940 the field, then consisting of three Rodessa gas wells, was acquired by Lone Star Gasoline Co. et al. for the purpose of developing

the gas reserve. Construction of a recycling plant was begun and this plant was placed in operation during January 1941. The royalty interests in the anticipated productive area of the field were pooled into gas-condensate units and these units were subsequently consolidated into one unit which made possible the cycling of the field for condensate recovery.

Additional development of the gas cap was carried on until at the end of 1945, 16 wells had been completed in the main Rodessa reservoir. Two of these wells located in the structurally highest area of the field were used as gas-injection wells and the remaining 14 wells were used as withdrawal wells. In this phase of the field's history, a substantial volume of gas was marketed from the reservoir, resulting in a pressure decline from approximately 4,000 psig. to approximately 3,300 psig.

During 1946, oil was discovered in the main Rodessa reservoir on the northwest flank of the field in the Lone Star 1 Ira Buckalew well. The oil rim was developed at a fairly rapid rate and as of the present date 67 wells have been completed in the oil rim. One of these wells has been abandoned, one is now used as a gas-injection well, and nine have been reclassified as gas wells.

Proved Acreage

There are currently 6 gas-injection wells, 20 gas wells, and 56 oil wells producing from the main Rodessa. Approximately 8,000 acres have been proved productive in the gas cap and approximately 3,200 acres have been developed in the oil rim. In addition to the wells completed in the main Rodessa, two wells are producing from the Peacock reservoir, five are producing from the Pettit, and eight are producing from the Travis Peak.

The Rodessa gas-cap fluid is a sweet gas substantially free of inerts and at the initial reservoir pressure yielded approximately 65 bbl. of 61.5° A.P.I. gravity condensate per million cubic feet. Oil produced initially from the Rodessa zone had a specific gravity of 44° A.P.I.

No samples of the initial oil-rim fluid were analyzed and consequently, accurate data relating to the solution gas-oil ratio, formation volume factor, viscosity of the oil, and related physical properties are not available. However, based on early well test observations, it has been estimated that the oil contained approximately 1,400 cu. ft. of gas per barrel of stock-tank oil in solution at the initial reservoir pressure and temperature. The formation-volume factor has been estimated to be 1.8 at initial reservoir conditions.

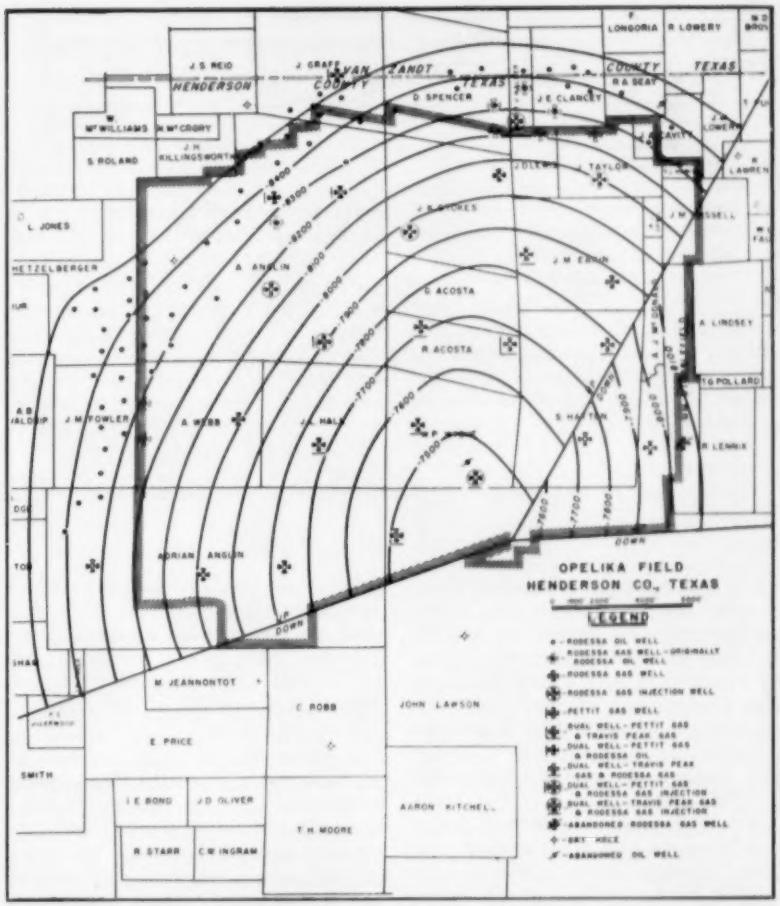


Fig. 2—Structural map of Opelika field contoured on top of the Rodessa "H" porosity. Outline of gas unit is indicated.

Processing and injection . . . The absorption-type recycling plant, in operation since January 1941, had an initial processing capacity of approximately 50,000 M.c.f. per day at a plant suction pressure of 1,800 psig. and a discharge pressure of 3,400 psig.

Compressors with a total rating of

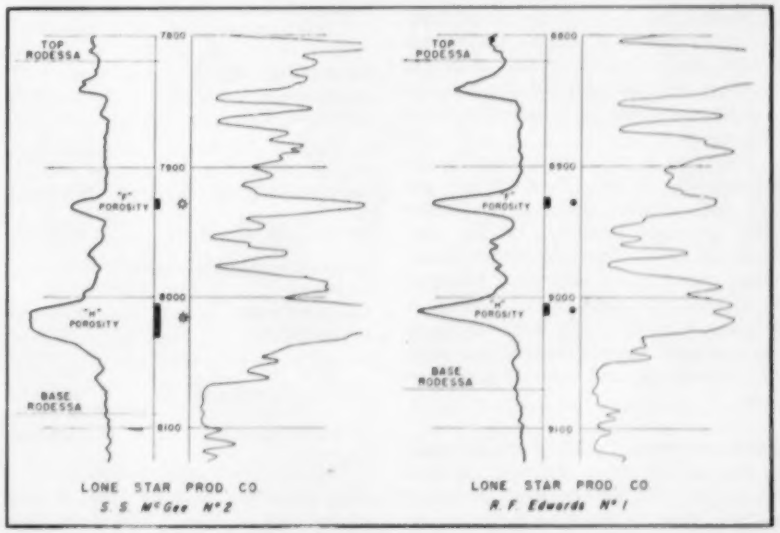


Fig. 3—Electric-log characteristics of Rodessa zone showing typical development in gas cap and oil rim.

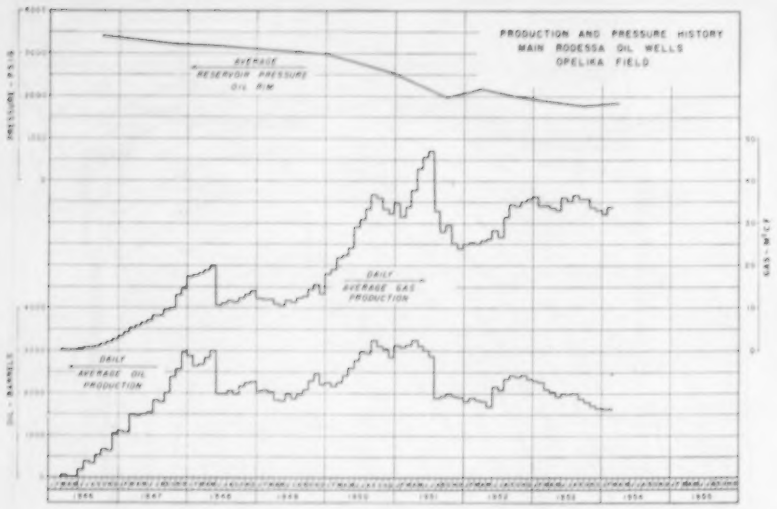


Fig. 4.

8,675 hp. are now in operation. Shortly after the discovery of oil, a low-pressure gathering system was installed and later enlarged to its present capacity of approximately 25,000 M.c.f. per day. Compression of the low-pressure gas is accomplished in three stages from a suction of approximately 150 psig. to a discharge pressure of approximately 3,000 psig.

The high-pressure gathering system now operates at a plant suction pressure of approximately 1,300 to 1,600 psig. The total capacity of this system is approximately 60,000 M.c.f. per day and the total injection capacity of the plant is 80,000 M.c.f. per day at 3,000 psig.

Plant absorbers operate at a pressure of 1,300 to 1,600 psig. on the high-pressure system and 450 psig. on the low-pressure system. A limited volume of residue gas is being marketed from the field, primarily during the winter season. For the past several years gas injection into the main Rodessa reservoir has exceeded gas production from that zone.

The plant is currently processing approximately 20,000 M.c.f. of gas per day with a total average condensate yield of approximately 18 bbl. per M.M.c.f. of gas from the Travis Peak, Pettit, and Peacock reservoirs. Currently residue gas from these sources is injected into the main Rodessa, since the available volume exceeds the plant fuel, shrinkage, and sales to the pipeline.

Field operation . . . All of the gas wells in the main Rodessa reservoir are connected into the high-pressure gathering system. Most of these wells are closed in during normal plant operation; however, all of the gas wells located in the original oil rim, i.e., gas wells which were once classified as oil wells, produce on a continuous schedule, as do two gas wells in the southwest area of the field where the condensate content is sufficient to permit economic cycling operation.

Eight of the 56 wells classified as oil wells operate into the high-pressure system and all of the others except one marginal well are connected to the low-pressure system. Two-stage separation is used on the oil wells connected to the high-pressure system and vapors from the low-pressure separators are produced into the low-pressure system.

Nine wells are now being produced by gas lift. In most cases, the gas-lift gas is obtained from the high-pressure system and production from the wells is delivered to the low-pressure system. All wells now being operated by gas lift are located near the extreme edges of the field where the pressure decline has been much more rapid than in other sections.

TABLE 1

Production History of Main Rodessa Limestone Reservoir, Opelika Field, Cumulative Totals to March 1, 1954

Gas produced, M.c.f.:	
From gas wells	253,339,576
From oil wells	60,589,003
Total	313,928,579
Gas injected, M.c.f.	265,584,726
Net gas produced, M.c.f.	48,343,853
Hydrocarbon liquids produced, bbl.:	
From oil wells	*5,877,640
From gas wells	†136,137
Total	6,013,777
Gas-well condensate	11,948,722
Total liquids	17,962,499

*Total stock-tank liquid hydrocarbons (includes condensate produced from oil wells and separated on leases). †Calculated oil in oil-condensate mixture produced from gas wells.

Production Performance

The cumulative gas production from the main Rodessa reservoir has amounted to approximately 314 billion cubic feet. Of this total, approximately 266 billion cubic feet or 110 per cent of the estimated gas initially in place has been injected into the reservoir leaving a net gas production of approximately 48 billion cubic feet or approximately 20 per cent of the gas initially in place in the reservoir. Cycling of this volume of gas has resulted in an estimated recovery of approximately 90 per cent of the total condensate initially in place.

At the present time the condensate content of the gas in the gas cap has been reduced to a very low point throughout most of the field. One area in which two wells are located is characterized by much lower permeability than the bulk of the field and because of the poor communication between these wells and the injection wells, the content in this area has remained at a relatively high level. The current volumetrically weighted average pressure of the reservoir is approximately 3,000 psi.

In a number of cases, there is a diversity of royalty ownership with gas and condensate being unitized while oil is not unitized. In addition to the diversity of royalty ownership, several operators own working interests in oil-rim wells which tends to further complicate the operation of a pressure-maintenance program in the field. For the most part, these operating problems have been solved through contracts between the plant and the various operators which permit the processing of gas in the plant and injection of the gas into the reservoir.

The field is operated under a net gas-oil-ratio rule as set out by the Railroad Commission of Texas, which gives credit to the injected gas in calculating the gas-oil ratio of each oil well. As a result, wells producing at high gas-oil ratios have not been penalized by a reduction in oil allowable. This factor alone has contributed largely to the oil recovery realized to date.

Gas has been injected primarily into wells near the apex of the structure up until the latter part of 1953. Prior to that time most of the gas was injected into the Lone Star 2 McElreath & Suggett and 1 C. H. Allyn wells. A

relatively small volume of gas representing the gas produced from that operator's oil wells has been injected into the Magnolia Petroleum Co. 7 Hearne well located in the original oil-rim area since 1949.

During 1953, three gas wells located near the initial gas-oil contact were converted to injection wells and most of the gas now is being injected into these wells. This change in location of the injection wells is primarily responsible for an increase in weighted average oil-well pressure observed between September 1953 and March 1954.

The average initial gas-oil ratio of most wells in the field was approximately 4,000 cu. ft. per barrel. The gas-oil ratio of the field has increased at an almost constant rate with the result that the average produced gas-oil ratio of wells classified as oil wells is now slightly greater than 20,000 cu. ft. per barrel and the cumulative produced gas-oil ratio of wells classified as oil wells is approximately 10,000 cu. ft. per barrel.

Wells originally completed as oil wells and which have gas-oil ratios in excess of 100,000 cu. ft. per barrel are now classified as gas wells. All of these wells produce some condensate with the oil and in determining the actual gas-oil ratio of these wells, calculations are made using the specific gravity of the condensate-oil mixture and the specific gravities of undiluted oil and condensate produced from the field to determine the fractional part of oil in the mixture.

Estimates of the volume of condensate produced from these wells have been made and taken into account in estimating recoveries of oil and condensate.

The average reservoir pressure in the oil rim as of the date of first oil production was estimated to be approximately 3,400 psig. and the average initial oil-rim pressure was estimated to be approximately 4,100 psig. This decline in pressure caused by gas-cap withdrawals resulted in considerable shrinkage of the reservoir oil and it appears that there was sufficient free-gas saturation in the oil rim at the time of oil discovery to permit movement of free gas throughout the bulk of the reservoir.

This ability of the gas to move freely through the oil rim has prevented the formation of a definite gas front. The movement of the gas into the oil rim can be described more clearly as a transitional gas front in which the gas saturation decreases toward the edge of the field.

The production and pressure history of the oil rim is shown graphically in Fig. 4. An analysis of the oil recovery is limited in accuracy to the reliability of the estimates of the physical properties of the oil and the estimation of the condensate produced from oil wells. Assuming the estimates of these values are reasonably accurate, the average field oil recovery has been approximately 27.4 per cent as of February 28, 1954, and the current annual production is approximately 2.2 per cent of the oil originally in place.

". . . Program has resulted in increased recoveries of both oil and condensate and . . . ultimate recovery should exceed the recoveries normally assigned to this type of operation."

The oil recovery has varied considerably over different areas of the field. The oil rim is separated by areas of poor permeability into four segments. An analysis of the operating methods employed in each segment and the recovery to date has been made and appears to be sufficiently reliable to give a comparison of oil recovery by gas-pressure maintenance as opposed to primary depletion.

Each segment will be referred to by names of leases falling in that segment. The Hearne segment is the portion of the oil rim in the northeast part of the field. The Buckalew segment is the area on the northwest flank of the field and the Tedford segment is the small area containing seven wells immediately north of the Buckalew segment and separated from the Buckalew segment by a zone of low permeability. The Laco segment on the west side of the field is the largest and most densely developed.

All of these areas except the Tedford area have excellent communication with the gas cap and the gas-cap injection pattern has been sufficient to arrest the natural decline in pressure to a large extent. In the Hearne area, pressure maintenance by gas-cap expansion has been supplemented by local injection into the oil rim through the 7 Hearne well. Calculations indicate that very little, if any, gas cap gas is reaching the Tedford area, and wells in this area have performed as if producing from a solution gas-drive field.

As of February 28, 1954, an estimated 35 per cent of the oil originally in place had been recovered from the portion of the Hearne segment immediately adjacent to the Hearne injection well. Pressures in this area have been maintained at a higher level than in other areas in the field and the recovery to date is higher than other areas.

Gas-oil ratios in the vicinity of the Hearne injection well would indicate that this area is in a later stage of depletion than any other section of the field. To date, the estimated recovery from the entire Hearne segment has amounted to approximately 28 per cent.

Estimated recoveries in the other segments are: Buckalew, 23 per cent; Tedford, 15 per cent; and Laco, 31 per cent. It appears that the primary benefits received from local gas injection have been the maintaining of adequate pressure to produce the wells without artificial lift and an accelerated rate of production.

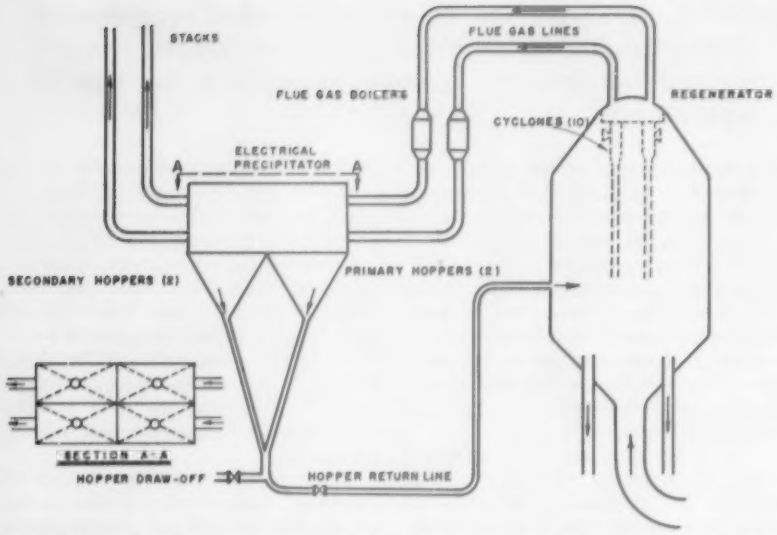
As of now, it would be difficult to determine whether gas injection in the oil rim would yield any greater recovery than gas injection in the gas cap in areas with good communication between the oil rim and gas cap. It appears certain, however, that the pressures in the Hearne segment would be considerably lower if gas had not been injected into the 7 Hearne well.

A study of the Tedford area indicates that these wells are now near depletion and that ultimate recovery will probably not exceed 20 per cent. Although the ultimate recovery from the field will be determined by the economics of processing and injecting gas at the anticipated higher gas-oil ratios, it appears that recovery from the field under the pressure-maintenance program may well exceed twice the recovery without benefit of gas injection.

Further expansion of the plant and gas-gathering system would not be economically feasible, and increasing gas-oil ratios present the problem of maintaining current income from the field.

With the data now available, it appears that the solution to this problem may be the injection of additional gas in the oil rim. The objectives of this procedure are the acceleration of the rate of oil production, and the production of a larger portion of the casing-head gas into the high-pressure system at a much lower cost than is required to handle the gas at a low pressure. Because of the lower expense of handling gas at the higher pressure, this factor is an important consideration in both ultimate recovery and ultimate profit.

In conclusion, it appears that the gas-injection program has resulted in increased recoveries of both oil and condensate and that the ultimate recovery of these products should exceed the recoveries normally assigned to this type of operation.



CATALYST-RECOVERY SYSTEM on F.C.C. unit at Shell's Wilmington refinery. Catalyst fines withdrawal program was carried out on this unit. Fig. 1.

Preferential Withdrawal of Catalyst Fines to

Reduce F.C.C. Stack Losses

by C. A. Seibert, Jr., and D. L. Cleveland

LOSS of catalyst fines in the flue gas discharged from the regenerators of fluid catalytic cracking plants is an important factor in plant operation. Although in some cases substantial losses can be tolerated economically, local atmospheric conditions and proximity to centers of population may make it desirable to avoid large losses to the atmosphere.

Authors associated with Shell Oil Co., Wilmington, Calif. Paper presented during mid-year meeting of A.P.I., refining division, Houston, May 12, 1954.

The catalyst dust discharged is substantially inert and nontoxic, and its nuisance value is probably small compared with that of the much larger quantities of soil dust frequently distributed by the wind.

Nevertheless, in an urban area such as Los Angeles, where an all-out effort is being made to control all sources of confirmed or suspected atmospheric pollutants, control of dust emission is a logical part of the community program.

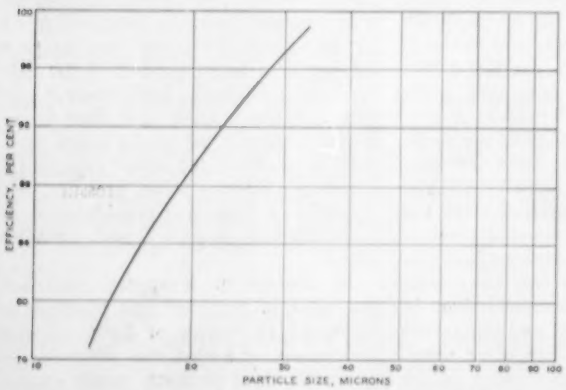
In Los Angeles County legal restrictions are imposed on the discharge of particulate matter from process equipment, the maximum rate for very large units such as catalytic cracking plants being currently fixed at 40 lb. per hour. This amount is extremely small in comparison with a typical inventory of 1,400,000 lb. of powdered catalyst in the plant, or a catalyst circulation rate of 3,000,000 lb. per hour. Conformance to the legal limit requires highly efficient dust-collection equipment and necessitates its operation at maximum effectiveness.

During the last 2 years a continuing study of stack losses and their relation to catalyst properties and operating variables in the Shell Oil Co. catalytic cracking plant at Wilmington, Calif., has been carried on. This work has led to an improved understanding of the factors influencing stack loss, and to a workable method for maintaining the loss rate within the required limit without the installation of additional recovery equipment.

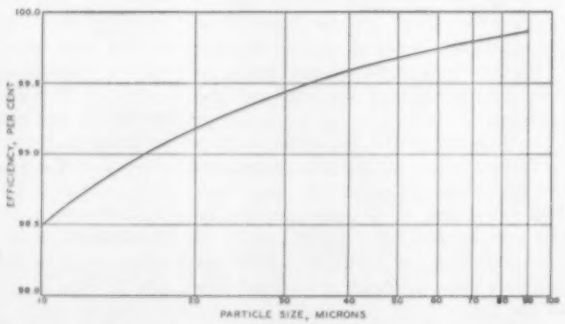
Experience on this unit has shown that it is possible to meet the 40-lb. per hour maximum with the conventional internal cyclones and Cottrell electrical precipitator if suitable measures are taken to reject catalyst fines from the system. This article summarizes the more significant information accumulated during this study and describes the current mode of operation.

Equipment tests . . . The plant on which the work has been done is a conventional Kellogg wartime "standard" downflow unit. Typical plant operating conditions are shown in Table 1.

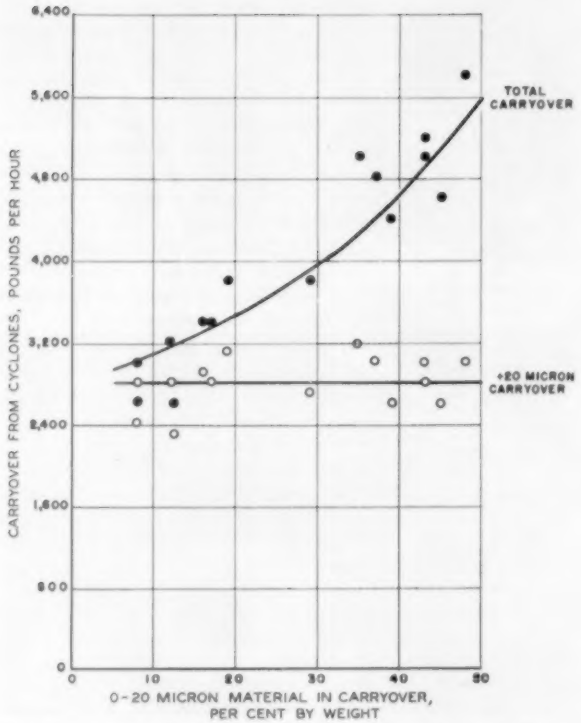
The regenerated-catalyst recovery system is shown diagrammatically in Fig. 1 and consists of a single-stage battery of 10 Buell cyclones followed by a four-cell, eight-section Cottrell electrical precipitator. Both of these facilities are size selective; i.e., the collec-



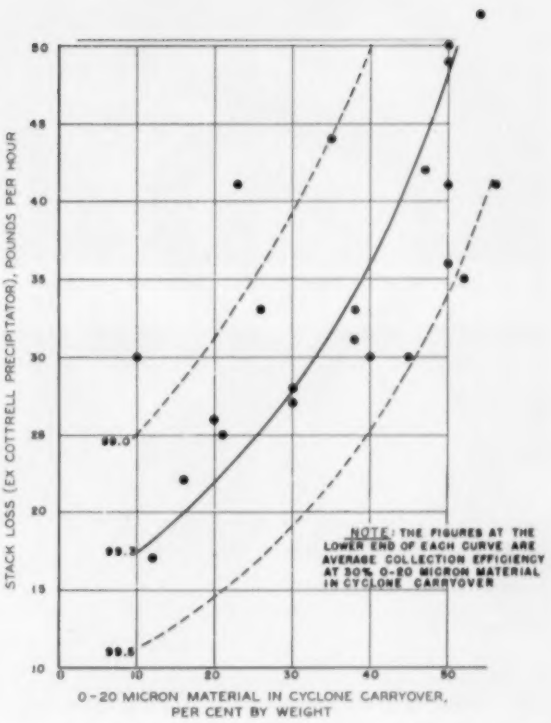
CYCLONE EFFICIENCY curve, derived from manufacturer's data. Fig. 2.



ELECTRICAL PRECIPITATOR efficiency curve, determined experimentally. Fig. 3.


CARRYOVER FROM CYCLONES, POUNDS PER HOUR
TOTAL CARRYOVER
+20 MICRON CARRYOVER
0-20 MICRON MATERIAL IN CARRYOVER, PER CENT BY WEIGHT

CYCLONE CARRYOVER, quantity vs. particle-size distribution. Fig. 4.


STACK LOSS (EX COTTRELL PRECIPITATOR), POUNDS PER HOUR
99.0
99.3
99.5
NOTE: THE FIGURES AT THE LOWER END OF EACH CURVE ARE AVERAGE COLLECTION EFFICIENCY AT 30% 0-20 MICRON MATERIAL IN CYCLONE CARRYOVER
0-20 MICRON MATERIAL IN CYCLONE CARRYOVER, PER CENT BY WEIGHT

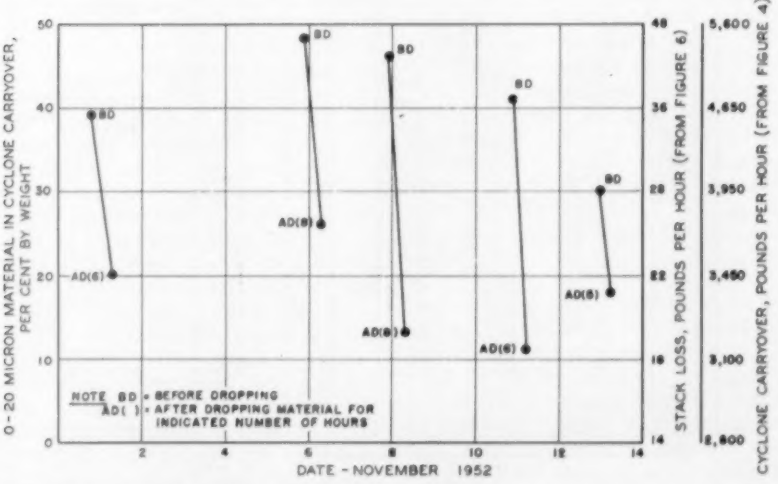
CALCULATED STACK LOSS vs. particle-size distribution of cyclone carryover. Fig. 6.

TABLE 1
Typical Plant Operating Conditions

Fresh feed rate to reactor, bbl. per day	25,000
Air rate, lb. per hour	235,000
Coke burning rate, lb. per hour	20,000
Fresh catalyst-addition rate, tons per day	6.1
Fresh catalyst type	MSA-2

tion efficiency varies with the size of the particles being acted upon. Fig. 2 is a curve of cyclone efficiency which has been derived from an efficiency curve provided by the manufacturer. The original curve has been modified slightly to conform to the conditions of cyclone loading believed to prevail in this installation.

No direct experimental proof of this curve is available because of the difficulty in measuring reliably the rate of catalyst carry-up into the cyclones. However, a calculation based on the increase in total catalyst escaping from the cyclones during the complete failuse of the dip leg of one cyclone indicates that the total inlet loading to the cyclones is approximately 80 to 100 tons per hour.

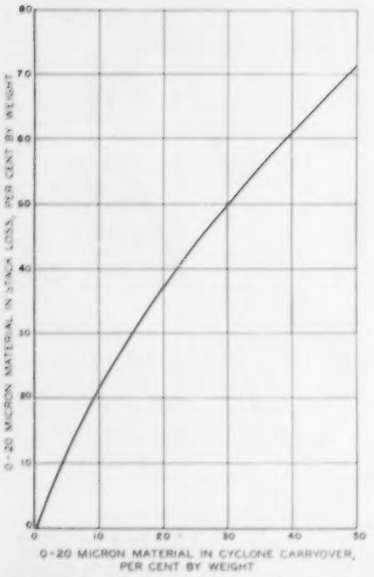

0-20 MICRON MATERIAL IN CYCLONE CARRYOVER, PER CENT BY WEIGHT
STACK LOSS, POUNDS PER HOUR (FROM FIGURE 6)
CYCLONE CARRYOVER, POUNDS PER HOUR (FROM FIGURE 4)
BD
AD(6)
NOTE BD = BEFORE DROPPING
AD( ) = AFTER DROPPING MATERIAL FOR INDICATED NUMBER OF HOURS
DATE - NOVEMBER 1952

EFFECT OF BATCHWISE REMOVAL of precipitator hopper material on recovery-system loading. Fig. 5.

Collection efficiency . . . Fig. 3 is a curve showing the efficiency of the electrical precipitator as derived from experimental data. A collection efficiency between approximately 99 and 99.5 per cent is indicated. The quantity of material passing the precipitator has been determined on a routine basis for several years. In a few cases sufficient material has been collected from the stack gases to permit determination of the particle-size distribution

Comparison of Figs. 2 and 3 reveals that the size selectivity of the precipitator is much less pronounced than for the cyclones. Because of this size selectivity the loss of catalyst from the plant stacks is dependent not only on the quantity of material reaching these recovery facilities from the regenerator bed, but also on the particle-size distribution of this material.

For the purposes of this discussion the catalyst passing through the recovery system will be divided into two size fractions, viz., 0 to 20-μ fines and 20+-μ material, as determined by isopropyl alcohol (IPA) sedimentation method. This simplification has



PARTICLE-SIZE DISTRIBUTION of stack loss vs. particle-size distribution of cyclone carryover. Fig. 7.

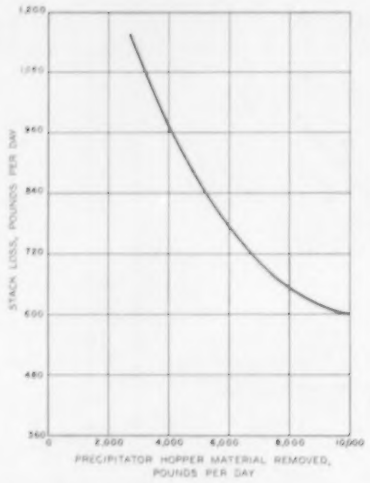
been found to provide a fairly adequate basis for characterizing the system.

Carryover regulated . . . As noted in the diagram of the recovery system (Fig. 1), the catalyst collected in the four precipitator hoppers may be returned to the regenerator or, alternatively, it may be removed from the plant and discarded. Early in this work it was recognized that this stream of catalyst, which contained a relatively large amount of 0 to 20-μ material, constituted an important recycle for fines when it was returned continuously to the regenerator.

The high concentration of fines in the hopper material, in comparison with the very small amount in the circulating equilibrium catalyst—less than 1 per cent by weight of 0 to 20-μ material—indicated that these fines, after returning to the regenerator, were being rapidly carried up again through the recovery facilities. In order to check this point the stream of catalyst which normally was returned to the regenerator from the precipitator hoppers was rejected from the system and discarded for a period of several hours. Quantity and particle-size determinations were made on the material passing the regenerator cyclones and entering the precipitator.

The results of these determinations and others made since this initial work are shown in Fig. 4.

Therefore, it follows that the carryover of material to the precipitator, and hence the stack loss, may be controlled by regulation of the amount of fines



STACK LOSS vs. precipitator hopper material withdrawn. Fig. 8.

in the unit. Fig. 5 indicates the effect of periodic withdrawal of material from the precipitator hoppers with regard to stack loss.

The solid line in Fig. 6 is a calculated curve of the quantity of the stack loss as a function of the size distribution of the material passing the cyclones and entering the precipitator. This curve was calculated from Figs. 3 and 4 by multiplying the cyclone carryever by the collection efficiency of the electrical precipitator. Collection efficiencies of 98.8 and 99.5 per cent for 0 to 20-μ and 20+-μ materials, respectively, are obtained from Fig. 3 by calculation of the average weight midpoints of the two fractions.

Efficiency graph . . . If the stack loss at any given particle-size distribution is compared with the corresponding cyclone carryover (Fig. 4), the average collection efficiency of the precipitator may be calculated. The solid-line curve, drawn as outlined hereinbefore, has an indicated average collection efficiency of 99.3 per cent for a material containing 30 per cent 0 to 20-μ fines.

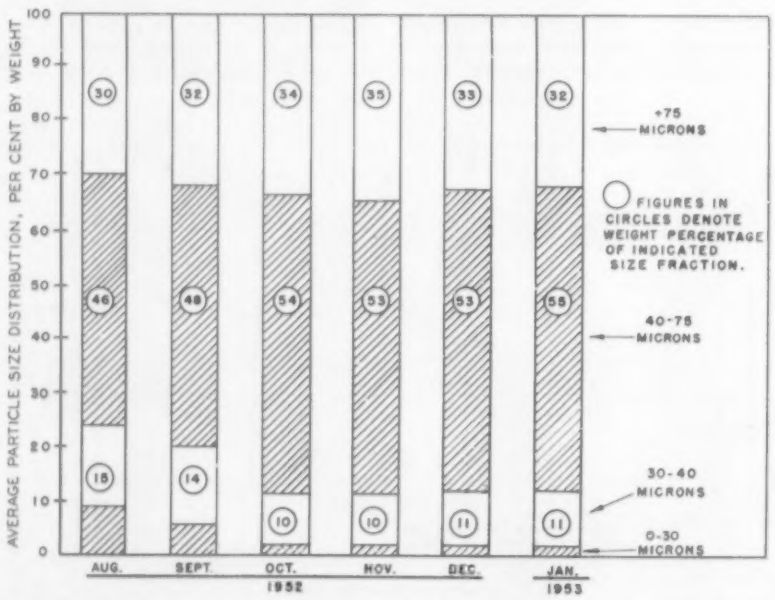
The dotted-line curves were drawn for average collection efficiencies of 99.0 and 99.5 per cent at the same particle-size distribution.

Fig. 7 is a calculated curve of the size distribution of the stack loss as a function of the size distribution of the material passing the cyclones and entering the precipitator, and is derived in the same manner as Fig. 6.

At steady-state conditions a particle-size material balance as well as a weight material balance must be maintained. Fines of 0 to 20-μ size constantly are being added to the system with fresh catalyst, and are being made in the system through the mechanisms of attrition and shrinkage of larger particles. In order to satisfy the material-balance requirements, this same quantity of fines must be eliminated from the system.

Fines addition . . . If the quantity of fines being added and made in the system is known, and if the loss of fines with clarified oil is determined and the loss through the stacks is specified, then the quantity of fines which must be removed from the precipitator hop-

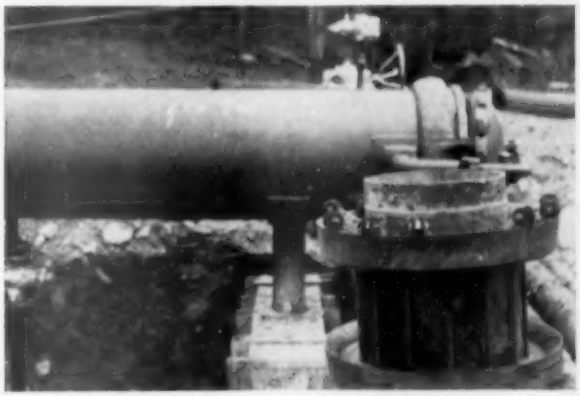
(Continued on page 90)



PARTICLE SIZE distribution of equilibrium catalyst. Note decrease of 0 to 40-μ material from 24 to 13 per cent. Fig. 9.

Squeeze pump and gages at scraper trap. Author is in foreground.

Injecting fluorescent dye into suction side of pump.



Pig with rattlers for noise making to aid in spotting in the line.

Bull plug and bypasses where line was cut to isolate a leak.

Trans Mountain Oil Line Posed Unusual Preoperation Testing Problems

by John H. Topik

THE Trans Mountain oil pipe line in western Canada offered a number of unusual testing problems due to the abrupt elevation changes, inaccessibility of terrain, and lack of communications during the preoperation period, as well as considerations of weather and construction conditions. The line extends 718 miles from the receiving terminal near Edmonton, Alta., across the Rocky Mountains to the delivery terminal near Vancouver, B.C., and consists of 24-in. o.d. expanded pipe varying in thickness from ¼ to ½ in. The final "tube" was mill electric welded from end to end, and contained 110,000 transverse field welds.

The line was water-tested from end to end, including scraper traps, bypasses, and station suction and discharge piping. Test periods of 6 hours each were agreed upon among engineers of the Board of Transport Commissioners of Canada, of the line designers Canadian Bechtel, Ltd., and of the Trans Mountain operating organization.

Author was with Canadian Bechtel, Ltd., during hydraulic testing of Trans Mountain Oil Pipe Line Co. system.

The test periods were by actual consent later extended to 12 hours in order to obtain more conclusive results. The actual line testing was directed by the Trans Mountain operating management, performed by a subsidiary organization, and witnessed by Board of Transport and Canadian Bechtel engineers. For Trans Mountain the test work was directed by A. F. Terrill, while L. F. Young supervised the field crews.

Pressure drop . . . A pressure drop of 10 psi. in 12 hours was accepted as permissive on the basis that a small drop should be attributed to air absorption by the water, air pockets, and temperature changes. In this respect it was calculated — and confirmed by measuring the makeup water pumped in—that in a 24-in. line, pressure drop of 1 psi. per mile accompanies a leak of approximately 0.02 bbl. of test water. Thus, if the static pressure in a 25-mile section drops 100 psi. in 12 hours, the water leakage would be 25 by 100 by 0.02 or 50 bbl. during the 12-hour period.

A rough approximation of the size of the leak-hole can also be calculated by applying the orifice formula.

$$A = cQ\,(2gh)^{1/2}$$

when the average head on the test section and the approximate loss is known:

A = square feet
c = coefficient of about 0.5
Q = cubic feet per second
h = head in ft.

The test of the line was closely coordinated with the construction schedule. The test work started as soon as roads and right-of-way were passable, in early spring of 1953 on the sections completed in 1952. The test work eventually caught up with the 1953 construction and enabled oil to flow into

the delivery terminal the day after the final tie-in weld nearby was made.

First tests . . . First tested was the Rocky Mountain portion of the line extending from the eastern boundary of Jasper National Park to Kamloops. (Excepted then was a roadless, mountainous 25-mile section which had to be constructed late in 1953). Testing was next started from the eastern terminal at Edmonton and carried up to the park boundary, thus permitting the oil filling of tested sections of the line to proceed. The oil column pushed the test water ahead and dumped it into conveniently located streams, saving only the water needed for the test of the more westerly sections.

Early purging of the water from the eastern end of the line was necessary also because freezing starts early in the prairies and muskeg areas of Alberta, whereas the western section near the Pacific Coast enjoys a more moderate climate.

In planning the test, use was made of a line-elevation profile chart on which a graph had been superimposed showing the permissible pressure that would subject the installed wall thickness to 65 per cent of its yield strength. Also plotted on the chart were hydraulic gradients for daily oil flows of 75,000 bbl. with two stations, 120,000 bbl. with three, 145,000 bbl. with four, 20,000 bbl. with six, and 300,000 bbl. daily with 14 stations.

A study was then made through consideration of maximum gradients as well as availability of line shutoff or block valves (at pump stations, scraper traps, river crossings, etc.) to select test sections of practical length and the pressures needed to stress every point to at least 125 per cent of anticipated flowing pressure under the highest gradient, but not in excess of 90 per cent of pipe-wall yield strength.

Yield-point pressure . . . In all cases the pressure at the yield point was computed from the formula

$$P = \frac{0.9\,(2sxt)}{D}$$

where:

s = yield strength of pipe, varying from 46,000 to 52,000 psi.

t = wall thickness

D = (OD × ID)/2

0.9 allows for wall-thickness variation.

Ninety per cent of yield pressure

. . . THESE MEN DIRECT

H. H. ANDERSON
V.p. and Gen. Mgr.
Former Shell vice-president before joining Trans Mountain. A degree in electrical engineering from University of Southern California. 1952-53 chairman of A.P.I. committee on pipeline technology.

ERIC DAVIS
General Superintendent
Formerly superintendent with Imperial Oil, Ltd., before joining Trans Mountain. A graduate of both the Universities of Alberta and McGill, he obtained his B.S. degree in 1927.

C. D. BAILEY
Chief Engineer
A native Scot, he received his technical training at the Royal Technical College in Glasgow. Came to Canada in 1929 and has held various positions in engineering until he joined Trans Mountain in 1952.

T. A. HASLETT
Operations Engineer
Has had past pipeline experience as project engineer with Winnipeg Pipe Line Co., Ltd., and Sarnia Products Pipe Line Division of Imperial Oil Ltd. Was graduated from University of British Columbia.

J. D. MENZIES
Supt., Prairie District
Served during W.W. II as an officer in the petroleum branch of the Royal Canadian Army. Before joining Trans Mountain he was a superintendent and director of Valley Pipe Line Co., a subsidiary of Royalite.

JOHN COWLING
Supt., Pacific District
A veteran of the oil industry in South America, he served in various capacities with Esso Columbiana in Bogota and International Petroleum Co. at Talara, Peru. Also served as captain of a tanker for Imperial Oil, Ltd.

Supersensitive amplifier in contact with pipe to pick up hissing of leak.

Isotope capsule installed on pig with rattlers.

TRANS MOUNTAIN ACTIVITIES

DERRICK HUMPHREYS
Asst. to V.p.-Gen. Mgr.
Was active in the mining industry in Australia and South Africa before becoming general manager of Edeco Canada, Ltd. A graduate of Western Australia School of Mines, he joined Trans Mountain in 1952.

R. F. BRUCE TAYLOR
Treasurer
Was educated at Lower Canada College, Royal Military College, and Queen's University. Was with Canadian Bechtel, Ltd., as financial advisor to Trans Mountain before being appointed treasurer in 1952.

J. W. PODMORE
Mgr., Purchasing-Stores
Has had a variety of experience with heavy-equipment companies. Was equipment manager with Marwell Construction Co., Ltd., and was purchasing agent with Comstock Midwestern before joining Trans Mountain.

G. G. THOMSON
Personnel Manager
Was previously employed by Canadian Bechtel, Ltd., as office and personnel manager. Before being appointed personnel manager of Trans Mountain, he held the position of public-relations officer.

E. C. HURD
Manager, Oil Movements
B.A. and B.Sc., University of Saskatchewan. Managed Toronto refinery of British American and refinery superintendent for Mercury Oil Refining Co. at Oklahoma City before joining Trans Mountain.

J. H. McQUARRIE
Sec'y.-Mgr., Lands, Tax, Insurance
Graduated with a LL.B. degree from University of Saskatchewan and was in charge of the legal department of Standard British Columbia and was assistant secretary of company.

thus varied from 890 psi. for ¼-in. pipe to 1,580 psi. for ½-in. thickness.

The length of test sections ranged from 25 to 70 miles, and extended from block valve to block valve. A few sections had to be bull-plugged because the required test pressure upstream near the discharge of the pumps was higher than the wall sections farthest downstream could withstand. The large block valves and bull plugs were equipped with 4-in. valves for bleeding and bypassing, and with ¾-in. gage connections.

Experience showed in a few cases of testing between valves that apparent loss of pressure was caused by improper valve seating. The use of bull plugs prevents such leakage, but it is time consuming due to the digging, cutting, draining, and welding involved.

The line was filled by a battery of five portable 10-in. double-acting, reciprocating pumps with 3 to 7-in. liners, V-belt driven by gasoline engines. These units were skid-mounted on a wooden platform near the river bank and discharged through a 6-in. header into 24-in. line. Against an average head the pumps delivered about 84,000 bbl. daily, filling 1¼ miles of 24-in. pipe per hour. Two high-pressure or "squeeze" pumps were similar units with pumps capable of developing 1,450 psi. with 2-in. liners. Availability of two such squeeze pumps gave the test operation greater flexibility, as one unit.

In some cases, the large centrifugal pumps and duafuel engines comprising

(Continued on page 86)

Here's what preoperation testing has to do . . .

PREOPERATION testing of oil pipelines is difficult to standardize. Suitable procedures depend largely on the physical features of the projects. Several basic decisions must be made prior to any test. Should the entire line be pressure tested or only hazardous sections, river crossings, and cased portions? This may often be decided by legal requirements and will be influenced by the extent of possible claims due to leaks or breaks.

Test pressure requirements are matters of judgment not covered by legal codes. Some companies specify that every point of the line be tested to a certain percentage of its yield strength. This would be impractical in lines with extreme elevation differentials. If a peak section in the line is tested to say 75 per cent of yield strength of the pipe, the adjacent low portions would be overstressed by the additional static head unless the section is isolated. Such might require testing of a large number of short sections. It appears needless to test high points so severely where working pressures are low.

Some pipe lines are tested in short sections to an arbitrary pressure of 100 or 200 psi. before backfilling or even before lowering in. This method is efficient and time saving, but it is inadequate because weak spots often are not disclosed, and only gross defects appear.

Whether oil, air or water should be used as the testing medium can be determined by economic and time considerations. Testing with oil is the simplest method where excessive drainage can be prevented and where the extent of possible damage and operating delay is of minor importance. Low-pressure air and soap tests of short sections on skids, or high-pressure air tests with the pipe in the ditch, may be desirable where the danger of freezing exists and where it does not interfere with construction progress.

High-pressure air tests are costly, however, and they are quite hazardous and require extensive precautions. Furthermore leakage of oil through block valves is likely to occur, which makes it difficult to decide whether a pressure drop is attributable to an actual leak, to an improperly closing valve, or to temperature variation.

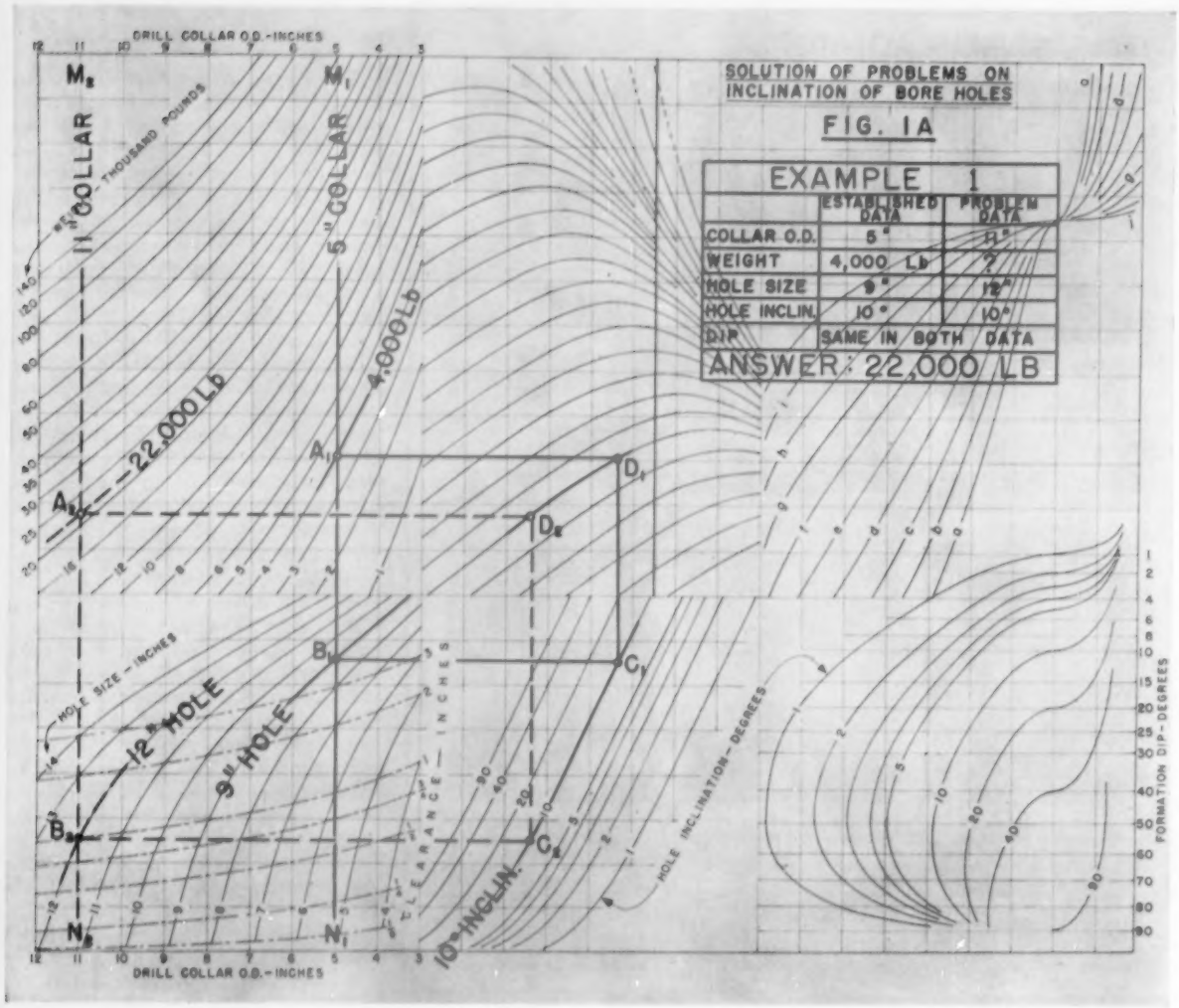
Important practical questions that must in any event, be settled, are

1. How long the test pressure shall be applied.

2. How much pressure drop will be acceptable as indicating a satisfactory test.

Large leaks, breaks, or splits will, of course, show up immediately but minor leaks require considerable time before the gage indicates their existence. The pointers of indicating gages have some inertia and stick, so that even a good-sized leak of 5 to 10 psi. per hour may not show in a 2-hour test. Also the water and remaining air do not come to rest in the pipe for quite some time, which makes a relatively long test period advisable.

Recording gages rather than indicating gages should be used for greater accuracy and for permanent records. The charts can be interpreted by an experienced eye, to indicate surges, the time required to fill the line, the time and place where a scraper hung up, the pressure of air pockets and finally the pressure at which leaks developed.



Charts Solve Hole-Deviation Problems

. . . and help determine most economical hole size

by H. B. Woods* and Arthur Lubinski†

A NEW chart has been developed for solution of practical problems on hole inclination and on determining the most economical hole size.

The chart, shown reduced in size in Fig. 1A, may be used to solve problems similar to the following:

In a given formation 10° hole inclination is maintained by carrying 4,000 lb. with 5-in. drill collars in 9-in. hole. Formation dip is 45°. What weight may be carried with 11-in. drill collars in 12-in. hole if formation dip does not change and the same angle of 10° is maintained?

This and any other problem solvable by Fig. 1A must contain the following elements:

1. Established data: These are the numerical values of drill collar o.d., weight on bit, hole size, and formation dip that resulted in a given hole inclination. They are obtained from past drilling experience in the formation under consideration and establish its degree of crookedness.

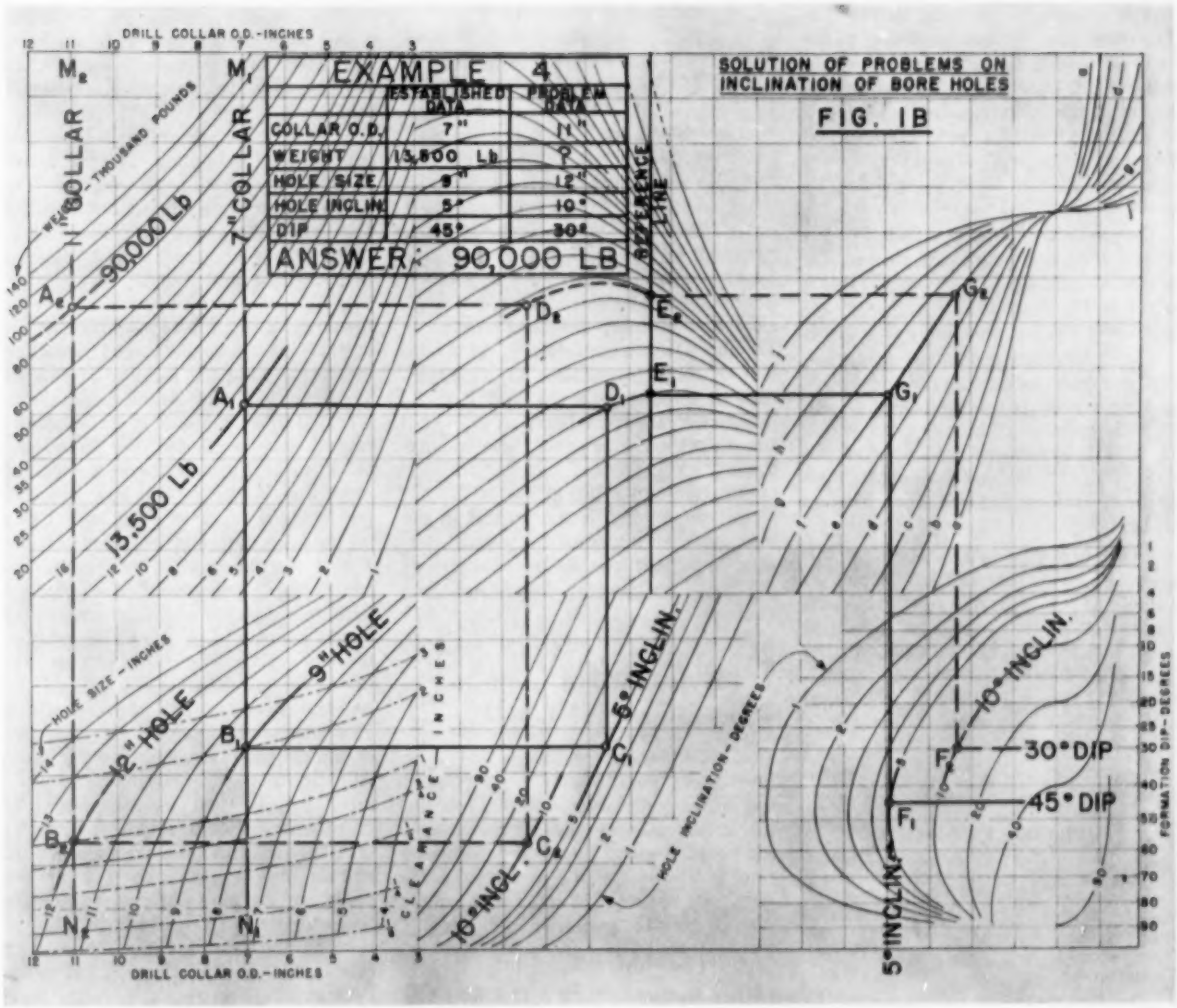
2. Problem data: These concern the hole to be drilled. They are the numerical values for all but one of the quantities listed under established data. At least one of the quantities is different in the problem data from the established data.

3. Unknown: The numerical value of the quantity not given in the problem data.

The chart has been prepared based on a mud weight of 10 lb. per gal. Corrections for other mud weights are so slight that they may be neglected.

A ratio of collar i.d. to o.d. of 0.375 has been used. This results in insignificant errors for all collars in general

*Hughes Tool Co., Houston, and †Stanolind Oil & Gas Co., Tulsa. Paper presented at A.P.I. Mid-Continent district meeting, Oklahoma City, March 18, 1954. Mathematical appendix is omitted but is obtainable through authors.



use except the very smallest. Errors may be appreciable for 4-in. collars with large bore.

More accurate results may be obtained from a full-size chart which can be furnished by the authors.

If there is neither change in formation dip nor in hole inclination between the established data and the problem data, the problem may be solved without the actual knowledge of dip and the two right-hand sections of the chart are not needed. The problem stated above is of this type.

For clarity the data of this and the subsequent problems will be tabulated in the following way:

DRILLING EXAMPLE 1

	Established data	Problem data
Collar o.d., in.	5	11
Weight, lb.	4,000	(?)
Hole size, in.	9	12
Hole inclination, deg.	10	10
Formation dip	Same in both data	

Using the established data, locate points and draw lines as follows (see Fig. 1A) line: M_1 N_1 (5-in. collars); point A_1 (4,000 lb.); point B_1 (9-in. hole); point C_1 (10° hole inclination). Complete rectangle A_1 B_1 C_1 D_1.

Using problem data proceed as follows: M_2 N_2 (11-in. collars); B_2 (12-in. hole); C_2 (10° hole inclination); D_2 (point located on the same curve as D_1). Complete rectangle A_2 B_2 C_2 D_2.

Read unknown weight at A_2: 22,000 lb.

DRILLING EXAMPLE 2

	Established data	Problem data
Collar o.d., in.	5	11
Weight, lb.	4,000	22,000
Hole size, in.	9	(?)
Hole inclination, deg.	10	10
Formation dip	Same in both data	

A similar construction of two rectangles as in Example 1 may be used. Read unknown hole size at B_2: 12 in.

DRILLING EXAMPLE 3

	Established data	Problem data
Collar o.d., in.	5	(?)
Weight, lb.	4,000	22,000
Hole size, in.	9	12
Hole inclination, deg.	10	10
Formation dip	Same in both data	

This problem cannot be directly solved. It is necessary to try a few collar sizes and proceed for each of them as in Example 1, until a collar size is found that satisfies the other problem data.

When the problem involves a change in either hole inclination or formation dip, we must use formation dip in both established data and problem data. Consider the following:

DRILLING EXAMPLE 4

	Established data	Problem data
Collar o.d., in.	7	11
Weight, lb.	13,500	(?)
Hole size, in.	9	12
Hole inclination, deg.	5	10
Formation dip, deg.	45	30

The solution is indicated in Fig. 1B. The first part of the problem is the same as before, namely from the established data, exclusive of formation dip, construct the rectangle, A_1 B_1 C_1 D_1 as in Example 1. In Example 1, for which hole inclination and formation dip were constant, D_2 was located on the same curve as D_1.

On the other hand, if either hole inclination or formation dip change, D_2 is not necessarily located on the same curve as D_1. Therefore, we must establish the curve on which D_2 is located.

Using established data for formation dip and hole inclination, locate points and draw lines as follows (see Fig. 1B): E_1 (intersection of the curve on which D_1 is located with the vertical reference line); F_1 (45° dip and 5° hole inclination); G_1 (intersection of lines through E_1 and F_1).

Using problem data, proceed as follows: F_2 (30° dip and 10° hole inclination); G_2 (located on the same curve as G_1); E_2 (located on the reference line); M_2 N_2 (11-in. drill collars); B_2 (12-in. hole); C_2 (10° hole inclination); D_2 (point located on the same curve as E_2). Complete rectangle A_2 B_2 C_2 D_2.

Read unknown weight at A_2: 90,000 lb.

DRILLING EXAMPLE 5

	Established data	Problem data
Collar o.d., in.	7	11
Weight, lb.	13,500	90,000
Hole size, in.	9	(?)
Hole inclination, deg.	5	10
Formation dip, deg.	45	30

This problem may be solved by a construction similar to the one used in Example 4. Read unknown hole size at B_2: 12 in.

DRILLING EXAMPLE 6

	Established data	Problem data
Collar o.d., in.	7	(?)
Weight, lb.	13,500	90,000
Hole size, in.	9	12
Hole inclination, deg.	5	10
Formation dip, deg.	45	30

This problem cannot be directly solved. It is necessary to try a few collar sizes and proceed for each of them as in Example 4.

DRILLING EXAMPLE 7

	Established data	Problem data
Collar o.d., in.	7	11
Weight, lb.	13,500	90,000
Hole size, in.	9	12
Hole inclination, deg.	5	(?)
Formation dip, deg.	45	30

This problem cannot be directly solved. It is necessary to try a few hole inclinations and proceed for each of them as in Example 4.

DRILLING EXAMPLE 8

	Established data	Problem data
Collar o.d., in.	7	11
Weight, lb.	13,500	90,000
Hole size, in.	9	12
Hole inclination, deg.	5	10
Formation dip, deg.	45	(?)

Using established data, construct rectangle A_1 B_1 C_1 D_1 as in Examples 1 or 4. Similarly, using problem data, construct rectangle A_2 B_2 C_2 D_2, then locate points and draw lines as follows: points E_1 and E_2 (located on the reference line and on the same curves as D_1 and D_2 respectively); F_1 (45° dip and 5° hole inclination; G_1 (intersection of lines through E_1 and F_1); G_2 (located on the same curve as G_1 and a line through E_2); F_2 (10° hole inclination).

Read unknown dip at F_2: 30°.

Installment No. 2 will appear in the next issue of the Journal and will present important conclusions concerning the most economical collar and hole size.

Trans Mountain Pretesting

(Continued from page 83)

the regular pump-station units boosted the water which the portable battery delivered to local station tanks, and the squeeze pump added the necessary final test pressure. Due to careful planning, the entire 718-mile line—other than for final squeeze pumping—was filled from only four water sources.

Repair equipment . . . The line had been back filled and the contractors had removed their spreads prior to the test, thus the test crew had to be equipped for every detail of the test and for any repair job. The crew's mobile repair equipment consisted of two backhoes and two tractors with sidebooms and blades, oil-field trucks, power wagons, and a fleet of Jeeps. The trucks and Jeeps were equipped with two-way radio. The value of good communications can hardly be overemphasized in this testing operation where close coordination over considerable distance is required.

Air and construction debris were removed from the line by means of "pigs" or scrapers with three rubber rings which were forced through the pipe by the filling water. These "trash-haul" scrapers carried rattlers and a radium isotope capsule to enable the foot patrol to follow them. Ordinary Geiger counters were found rather ineffective, especially in marshy ground, and holes had to be dug every 3 miles to bring the Geiger counters into direct contact with the pipe. The scrapers did an effective job of removing air, but experience showed that they tended to hang up, especially at valve seats, when moving at a velocity of less than 1 m.p.h.

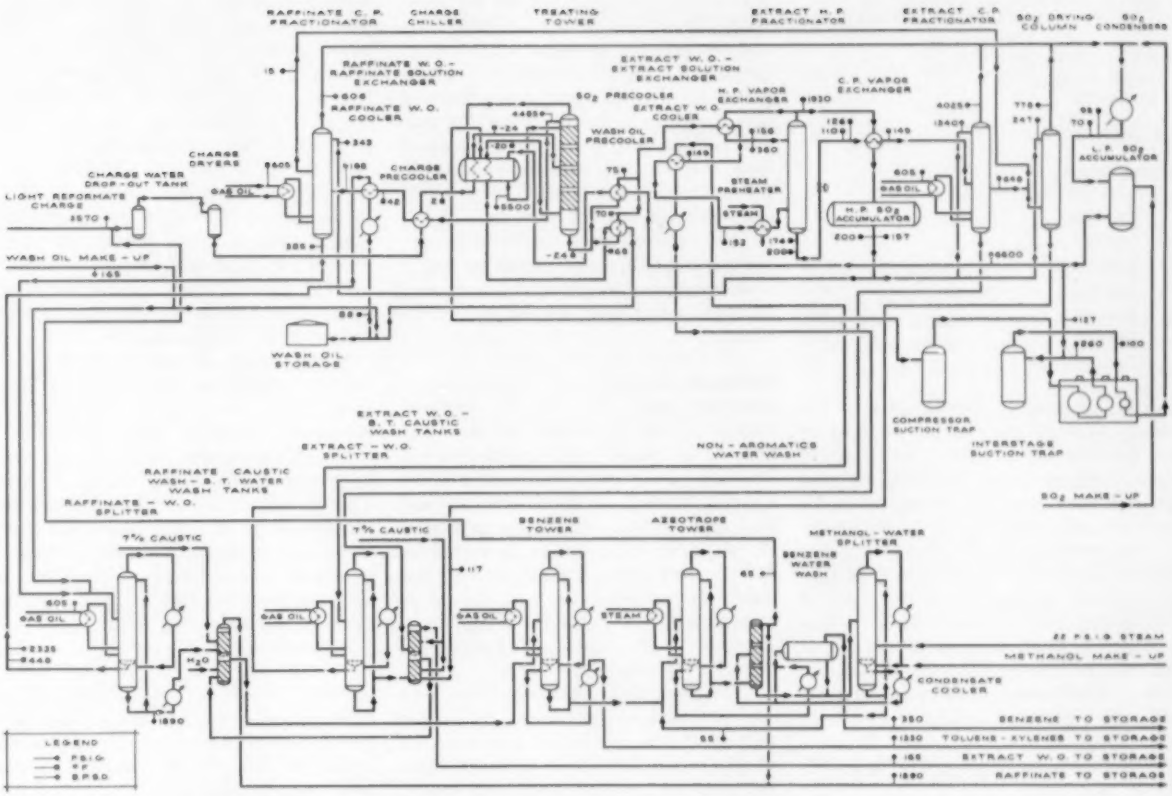
Several leaks were found in bolted connections, insulating flanges, valve bonnets, and station and scraper-trap piping. These were dug out and checked first when the gages indicated a leak. Preferably all bolted parts should not be backfilled until tested.

Locating leaks . . . Major splits or welded defects soon forced water to the surface, but the locating of smaller leaks can be a considerable headache in a buried line. One leak in an unusually rugged section eluded the round-the-clock hunt of a large force of men for more than 3 weeks. The leak was estimated at 10 to 12 bbl. per hour based on pressure drop and length of section. Visual inspection bore no results because the right-of-way was studded with rain puddles and numerous small water courses. Use of leak detectors brought no results. The section was filled with an alkaline solution of fluorescent dye and put under pressure. Daytime patrols searched for evidence of the dye and checked all water holes with litmus paper for alkalinity, while night patrols tried to find traces of fluorescence with ultraviolent lamps.

All during this time the men continued in their attempts to pick up the hissing of escaping water with the highly sensitive sound amplifiers which had successfully located earlier leaks. Use of the amplifiers is effective, but rather backbreaking in rocky ground. Steel rods have to be rammed through the ground every 25 to 50 ft. to contact with the pipe. The rods will often glance off the buried rocks and it is hard to tell when the rod is on the pipe. Care has to be exercised not to damage the pipe coating.

The leaking section was finally cut and bull-plugged, first into two 12-mile lengths and eventually one of these into two 6-mile lengths in the final attempt to isolate the leak. There turned out to be two leaks a few feet apart, a 2-in. split in the pipe seam and a "shoefly" weld in the girth, both located at the bottom of the pipe on top of a hill where the internal pressure was a minimum.

Actually the leaks were found not under pressure but under a vacuum which was created when the line was cut and the high points were drained. The turbulence of the air entering the vacuum was picked up by an M-Scope to which a super-amplifier had been adapted, and inspection showed that the leaking water had been completely absorbed by the soil.



SULFUR DIOXIDE EXTRACTION UNIT for benzene and toluene-xylene production. Fig. 1.

Simultaneous Extraction of Benzene and Toluene By the Sulfur Dioxide Process

by R. A. Ratliff and W. B. Strobel

PURPOSE of this article is to review the operation of a commercial sulfur dioxide extraction process which is unique in three respects, as follows:

- High recoveries (98 to 99 per cent) of benzene and toluene-xylene fractions, which have been extracted simultaneously, are obtained.
- Only one stage of separation is needed to remove sulfur dioxide from the raffinate.
- Methanol is utilized for the azeotropic separation of nonaromatics from benzene.

The process scheme employed by Continental Oil Co. in the Lake Charles, La., refinery for the simultaneous extraction and purification of benzene and toluene is a sulfur dioxide solvent extraction modified for utilization of a hydrocarbon wash oil to effect high purities.

Authors are associated with Continental Oil Co. Ratliff is at Lake Charles; Strobel is at Houston. Paper presented at midyear meeting, A.P.I. Division of Refining, Houston, May 12, 1954.

A flow diagram of the process is presented in Fig. 1.

Feed preparation . . . The charge to the unit is a depentanized, light catalytic reformate produced by a Universal Oil Products Co. Platformer. The charge to the Platformer is a carefully controlled, narrow-boiling naphtha fraction. This naphtha contains practically all of the C_6 and C_7 aromatics and naphthenes contained in the straight-run gasoline produced from the crude oil processed in the refinery.

Naphthenes and aromatics in the C_8-molecular-weight range also are included in the charge to utilize the capacity of the unit. The charge naphtha is prepared as a heart-cut product on two 50-tray fractionating towers. The light reformate produced from the heart-cut naphtha has the physical properties shown in Table 1.

Aromatics Concentration

The light reformate enters the sulfur dioxide extraction unit at a designed rate of 3,570 bbl. per stream day. It passes through alumina driers for maximum removal of moisture, is chilled to approximately 5° F. in the precooler, and then is passed through the charge chiller in which the temperature is dropped to —25° F. The cold naphtha is charged to the treating tower which contains four separate raschig-ring-packed sections.

The naphtha flow normally enters the tower between the two middle sections; however, some flexibility of operation

TABLE 1—TYPICAL PROPERTIES OF LIGHT CATALYTIC REFORMATE

A.S.T.M. distillation, °F.:	
Initial boiling point	154
End point	286
Recovery, per cent	99
PONA analysis:	
Liquid, per cent by volume:	
Paraffins	47.4
Olefins	1.1
Naphthenes	5.0
Aromatics	46.5
Benzene	10.7
Toluene	31.3
C_8 aromatics	4.5

can be achieved by introduction of the charge between the two top sections or the two bottom sections. The relatively light naphtha tends to flow upward through the tower countercurrent to the heavier sulfur dioxide.

The aromatics in the charge are dissolved selectively in the sulfur dioxide phase, and are carried to the base of the tower. The raffinate phase, which contains a small amount of the sulfur dioxide, overflows from the top of the tower. This tower operates at 5.5 psia. through a pressure-equalizing line with the charge chiller and, thus, the low treating temperature of —20° to —24° F. is maintained.

Temperature effect . . . Fig. 2 illustrates the effect of extraction temperature on the concentration of aromatics in the extract solution for charge stocks of different volumetric average boiling points.[1] These data illustrate that, for a normal sulfur dioxide - to - naphtha charge ratio and a treating temperature of —20° F., the hydrocarbon portion of the extract-solution stream would contain approximately 75 per cent aromatics.

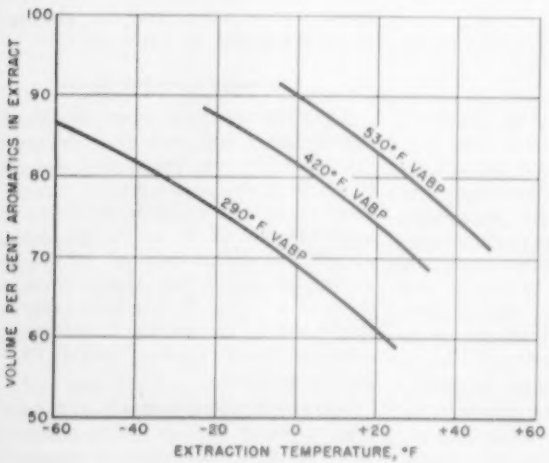
In the conventional sulfur dioxide extraction process this stream would pass to the distillation section for processing; however, in the modified extraction process as employed by Continental Oil Co. a relatively heavy paraffinic hydrocarbon is introduced into the treating tower below the bottom-packed section for the purpose of displacing the light paraffinic and naphthenic components of the charge naphtha from the extract solution.

This wash oil is of sufficiently high-boiling point (kerosine range) so that it can be separated from the extracted aromatic component by simple distillation.

Raffinate recovery . . . The raffinate solution—which consists of approximately 275 bbl. of sulfur dioxide, 1,875 bbl. of raffinate, and 2,335 bbl. of wash oil—overflows from the top of the treating tower, on level control, and exchanges heat in the charge precooler in which its temperature is raised to 42° F. After heat exchange with hot wash oil, whereby its temperature is increased to 188° F., the raffinate is charged to the raffinate C.P. (condenser pressure) fractionator.

This tower has 20 bubble trays, and was designed to operate at the sulfur dioxide system condenser pressure. All of the sulfur dioxide is removed from the raffinate solution in this one tower, so close temperature control is necessary to prevent contamination of both the overhead and the bottom streams. It has been found that best operating control can be achieved by operating the tower with a pressure-control valve on the overhead stream.

The raffinate solution flows from the base of the fractionator, on level control, to the raffinate-wash oil splitter. The raffinate, taken overhead, subcooled, caustic washed, and sent to storage, is a promising source of isohexane, isoheptane, and paraffin solvents.



EFFECT OF EXTRACTION temperature on aromatic concentration in extract. Fig. 2.

Extract recovery . . . The extract solution is pumped from the base of the treating tower, on interface level control, and the flow is split for parallel heat exchange in the sulfur dioxide precooler and the wash-oil precooler. The streams—at temperatures of 75° and 70° F., respectively — are combined and they exchange heat with the reflux of the extract H.P. (high pressure) fractionator which raises the temperature to 149° F. The temperature is raised to 152° F. in a stream preheater, after which the extract is charged to the extract H.P. fractionator.

Sulfur dioxide is recovered from the extract solution in two stages—as opposed to the one stage in the raffinate system—in order to effect heat recovery from condensing sulfur dioxide and to provide liquid sulfur dioxide reflux. This is accomplished by operation of the first stage at 200 psig., which provides condensing vapors at elevated temperatures for heat recovery and permits an expansion cooling of the bottom stream for condensing reflux.

Approximately 20 per cent of the sulfur dioxide charged to this tower is taken overhead and condensed at high pressure by exchange with the tower bottoms which have been cooled from 174° to 126° F. by taking a pressure drop of 90 psi. across a control valve. The condensed sulfur dioxide is used to reflux the raffinate and extract C.P. towers and the sulfur dioxide drying column and, because it is at 200 psi., no pumps are needed for circulation.

The cooled H.P. fractionator bottoms—extract solution which contains approximately 80 per cent of the sulfur dioxide—are charged to the extract C.P. tower, which is operated in a manner analogous to the raffinate C.P. tower. The sulfur dioxide is taken overhead to the low-pressure accumulator from which it is recirculated to the treating tower. The extract solution flows from the base of this tower, on level control, to the extract-wash-oil splitter.

This splitter is operated in a conventional manner to separate the concentrated aromatics from the wash oil.

Sulfur dioxide recovery . . . The sulfur dioxide vaporized in the charge chiller is compressed in three stages to condenser pressure, and is the only vapor required to be handled by compressors. This vapor, the vapors from the two C.P. fractionators, and the drying-tower overhead are condensed in common sulfur dioxide condensers, and the liquid is returned to the low-pressure sulfur dioxide accumulator.

For data on sulfur dioxide, see References 2 and 3.

Benzene recovery . . . The aromatic concentrate from the extract-wash-oil splitter is charged to the benzene tower in which an impure benzene is produced as the overhead product. The bottoms product is a toluene-xylene fraction wihch has the physical properties summarized in Table 2, and it is sent directly to storage.

TABLE 2—PROPERTIES OF TOLUENE-XYLENES STREAMS

Existent gum, mg. per 100 ml.	0.8
Gravity, °A.P.I.	*31.4 to 31.8
A.S.T.M. distillation, °F.:	
Initial boiling point	*215 to 217
10 per cent point	*226 to 231
50 per cent point	*231 to 234
90 per cent point	*240 to 250
End point	*290 to 308
Sulfur, per cent by weight	0.006
Doctor test	Sweet
PONA analysis:	
Liquids, per cent by volume:	
Benzene	2.3
Toluene-xylenes	95.8
Paraffins-naphthenes	0.9
Olefins	1.3
Blending value (A.S.T.M. D-908 research method) with addition of 2.0 ml. TEL per gal.	118.5
Blending performance number (A.S.T.M. D-614 aviation method) with addition of 4.6 ml. TEL per gal.	103
Blending performance number (A.S.T.M. D-909 supercharge method) with addition of 4.6 ml. TEL per gal.	250

*Typical inspection range.

The end use of the benzene produced at this plant is in Continental Oil Co.'s synthetic-detergent alkylate. For this purpose it is essential that the purity of the benzene be greater than 98.5 per cent, which requires that the content of paraffins, olefins, and naphthenes in the benzene boiling range be reduced by azeotropic distillation with methanol. (For data on the azeotropes see Reference 4.)

Benzene and methanol are charged to the azeotrope tower. Benzene is produced as the bottoms product and is water-washed before it goes to storage. Typical properties of the benzene produced on this unit are summarized in Table 3. It will be noted from these data that the benzene produced does not meet the acid wash colors of 2 and 1 for industrial-grade and nitration-grade benzene, respectively.

TABLE 3—PROPERTIES OF BENZENE STREAM

A.S.T.M. distillation, °F.:	
Initial boiling point	175
Dry point	177
PONA analysis:	
Liquid, per cent by volume:	
Benzene	99.0
Toluene	...
Paraffins-naphthenes	0.3
Olefins	0.7
Freeze point, °C.	4.95
Gravity, °A.P.I.	28.9
Acid-wash color, N.P.A.	5

If it were desired to market benzene of these grades, it would be necessary to acid treat or clay treat the material to meet the required color specifications.

The methanol is water washed in a three-stage tower, whereby the contaminating hydrocarbons are separated and discarded to gasoline storage. The water is removed from the methanol in a splitter, and both components are recycled.

Costs . . . The over-all plant material balance is shown in Table 4, and is the basis for the operating costs shown in Table 5. Because of insufficient cost history at this time the direct operating cost of 25.8 cents per barrel of charge should be used with reasonable caution. The utility and labor expenses are based on actual plant observations, but they represent only two-thirds of the operating cost. The relatively high fuel cost can be attributed to the fact that most of the reboil heat is supplied to the unit through a gas-oil heating belt. This would appear in the steam costs of more conventional units. Maintenance and chemical costs have been based on design figures because there are indications that they are realistic.

TABLE 4—MATERIAL BALANCE AND RECOVERIES FOR SULFUR DIOXIDE EXTRACTION UNIT

	Composition (per cent by volume)					
	Feed stream	Raffinate	Benzene	Toluene-xylenes	Azeotrope-tower overhead	Recovery
Benzene	10.7	0.3	99.0	2.3	76.0	98.4
Toluene-xylene	35.8	0.2	...	95.8	...	99.7
Paraffins-naphthenes	51.7	97.5	0.3	0.9	13.5	...
Olefins	1.8	2.0	0.7	1.3	10.5	...
Stream, bbl. per stream day	3,570	1,875	300	1,330	65	...

TABLE 5—INVESTMENT AND OPERATING COST OF MODIFIED SULFUR DIOXIDE PLANT

Plant design:	
Charge capacity, bbl. per stream day	3,570
Basis charge:	
Sulfur dioxide, per cent by vol.	154
Wash oil, per cent by vol.	70
Temperature, °F.	—21
Plant cost, dollars	2,660,000
	Cents per bbl. of charge
Direct operating costs:	
Utilities:	
Fuel at 11.2 cents per million B.t.u.	6.8
Cooling water at 0.86 cents per 1,000 gal.	1.1
Power at 1 cent per kw.-hr.	1.6
Steam at 25 cents per 1,000 lb.	1.5
Subtotal	11.0
Sulfur dioxide solvent at 6.35 cents per lb.	1.7
Chemicals	1.5
Labor	6.4
Maintenance	5.2
Royalty	None
Total	25.8

References

1. W. F. Wilkinson, J. R. Ghublikian, and P. Obergfell, "SO_2 Extraction Process for Aromatics Recovery," Chem. Eng. Progr. 49 (5) 257 (1953).
2. Sulfur Dioxide in Industry, bulletin of Ansul Chemical Co.
3. Sulfur Dioxide, bulletin of Tennessee Corp.
4. John H. Perry, Chemical Engineer's Handbook, Third edition, 635, McGraw-Hill Book Co., Inc., New York (1950).

Three Oklahoma Fracturing Jobs

(Continued from page 73)

sults of fracturing well C. This well pumped an average of 2½ bbl. of oil per day prior to treatment and following fracturing at 16 bbl. of oil per day. The increase was not sustained, however; and although additional oil has been recovered, the application is not an economic success.

Although not so obvious as in the case of well B, the extremely steep decline rate of well C is believed to signify a small drainage volume and the poor results from fracturing are again due to little remaining reserve.

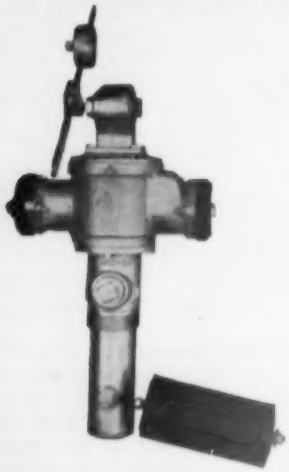
Finding likely prospects . . . Empirical correlations of fracturing results with other well characteristics have also been found indicative of those wells more amenable to treatment. In one instance, a statistical correlation of electrical logging data together with initial natural productivities was of value. Application of the method in other horizons or fields, however, would be dependent upon the correlative nature of electrical logging characteristics in the respective localities.

Separate empirical relationships should probably be developed for each pool since both the type and numerical magnitude of data may vary widely from reservoir to reservoir. Such cor-

relations with production behavior determined for other areas may be useful in selecting wells for treatment; or additional methods now being utilized, such as application of subsurface-pressure buildup data, may be preferred.

Faster or larger recovery . . . Economic gain from hydraulic formation fracturing may result from a more rapid recovery rate, increased ultimate recovery, or both. Precise evaluation of recovery gains obtained from fracturing on an initial completion may be difficult unless the application results in the well being transformed from definitely noncommercial into a paying well. Where production data are available on other wells with similar natural initial productivities but not fractured, comparison of the behavior of the treated with the untreated wells may allow fairly rigorous economic analyses.

Provided possible masking effects such as production restriction due to allowable can be delineated, it is considerably simpler to determine the gains from well fractured after a production decline trend is sufficiently established to allow reliable extrapolation of the untreated history.



Those endless steps to check tanks are now unnecessary. With an Enardo semi-automatic fill valve, the cocking lever mechanism is also a visual indicator of fluid movement and may be seen from the ground. The lever is easy to cock from the catwalk, just push end of weight lever down and your visual indicator is set. Lever weight up, tank filling; lever weight down, tank full and oil routed to next tank.

Optional equipment on the semi-automatic fill valve is a switch that will shut down the pumping engine, actuate a light on a central control panel, or in night operations, turn on a light at the tanks.

Find out how this process correlates with the Enardo Vapor Control system, by eliminating excessive opening of your hatches.

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Reduce F.C.C. Losses

(Continued from page 80)

per to maintain steady-state conditions may be calculated.

It has been determined by material balance that during the period covered by this report approximately 800 lb. per day of 0 to 20-μ material was being added to the plant with fresh catalyst, and 2,200 lb. per day was being made in the unit by shrinkage and attrition.

A limited amount of available data indicates that the loss of 0 to 20-μ fines with clarified oil is approximately equal to the loss of this material from the stacks. Enough information is thus available to permit establishing a curve of stack loss vs. precipitator-hopper material removed, as shown in Fig. 8.

Calculations based on this curve indicate that approximately 2 tons per day of catalyst must be removed from the precipitator hoppers in order to maintain the stack loss at less than the required limit of 40 lb. per hour.

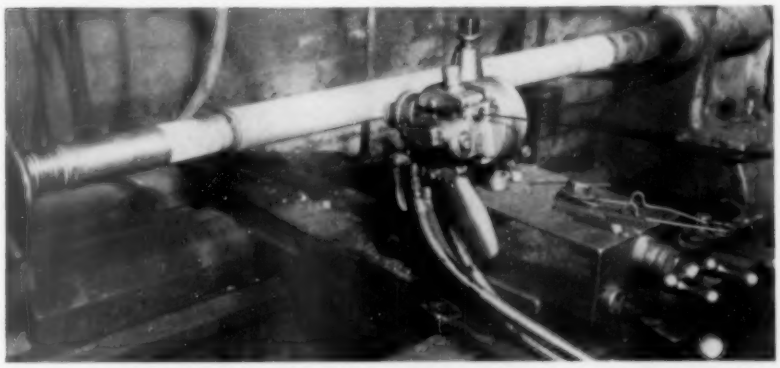
The removal of fines from the plant has been practiced on a routine basis since about August 1952. The accepted method consisted of rejection to storage of all of the material collected in the four precipitator hoppers until the desired quantity had been removed. Since that time the stack losses have been within the required limit.

Larger catalyst . . . Removal of material from the precipitator hoppers tends to increase the average particle size of the plant equilibrium catalyst. This shift in particle size comes about not only because considerable quantities of fines are removed from the plant, but also because the quantity of coarse equilibrium catalyst which may be removed to maintain inventory at a constant fresh-catalyst addition rate is decreased.

Fig. 9 indicates the magnitude of this change in particle size as determined by an IPA sedimentation method.

Although it generally is felt that increasing the average particle size of catalyst in a fluid catalytic cracking plant has a deleterious effect on the vapor-solid contacting efficiency, makes catalyst circulation more difficult, and may tend to increase plant erosion, there have been no conclusive effects on plant operation attributable to this change in particle-size distribution.

In June 1953 the fines-removal program was modified. Current operating practice consists of withdrawing continuously from the plant the catalyst collected in the secondary precipitator hoppers—a richer source of fines than the primary hoppers.



A sprayed hard-surface coating, stainless steel, molybdenum, or other coating can be employed to extend equipment parts life.

Metalizing increases pump-rod service 3,000 per cent

A LARGE eastern oil company had considerable trouble with pump rods in a 16 by 7 by 14-in. steam pump used for pumping crude-oil bottoms. Operating conditions for the rods are usually severe, the bottoms containing grit, sand, dirt, and other foreign matter. The pump was first put in service 2 years ago and the original cold-drawn steel rod lasted just 48 hours. It was replaced by a hardened steel rod which did little better. Then the company tried metalized stainless and found that the metalized rods would last for 4 weeks in 24-hour-a-day service. It was found that the shaft could be remetalized three times before it had to be scrapped because of limitations of the packing-ring adjustment due to reduced shaft dimension. That meant a total life of 12 weeks per metalized shaft, against 48 hours per original shaft.

But even that spectacular performance does not mark the limit of the profitable applications of metalizing to this maintenance headache.

After using the foregoing method with its own metalizing equipment for 2 years, the company called in the local machine shop which does considerable contract metalizing and is frequently asked by this company to handle special jobs too big to be ground or machined on the equipment in its own shops. The contract shop metalized one rod with a sprayed hard-surface coating and the other with a molybdenum coating; both were placed in service on the duplex pump at the same time.

Over 9 weeks later both rods were still in service 24 hours a day. The hard-surfaced rod showed some wear, but the molybdenum-coated rod was still in excellent condition.

Earth-boring machine saves rig time in West Texas-New Mexico

An auger-type bit is usually employed by this rig when drilling mouse hole, rathole, and first 40 ft. of surface hole, but when drilling in rocks, a cone-type rock bit used without fluid in the hole is used. Hydraulic raising and lowering of the mast make it possible to hold the kelly at any angle necessary.

VALUABLE rig time is saved by drilling contractors in West Texas-New Mexico by use of an earth-boring machine to dig the mouse hole, rathole, and 40 ft. of the surface hole before the rig moves on location.

The machine can usually finish all three boring jobs in about 2½ hours. The mast of the unit is hydraulically lowered and raised, and can be held at almost any necessary angle for drilling.

The pictures shown here were taken on a Shell Oil Co. lease in Denton pool of Lea County, New Mexico. If rock is encountered in any of the holes, the auger bit is replaced by a conventional cone-type rock bit, and "dry" drilling is employed.

The machine is operated as a service to drilling contractors by Basin Earth Boring Co. of Odessa, Tex.

Landing casing in shallow wells

by Scott E. Temple

A SIMPLIFIED and economical method of landing casing in shallow wells is being used by Union Oil Co. Basically, the conventional landing base and flanged tubing head are not used; slips and packing for supporting and sealing off the casing are replaced by a short column of fast-setting cement.

When landing the water or oil string, cement is pumped through the tubing head as well as the casing. The method is a safe one for the blowout preventer is not moved until the tubing is landed and the well is ready for completion.

Although the idea is not entirely new, the method has saved up to $975 per well for casing and tubing heads plus an average of $265 per well in rig time.

When ordering the surface pipe for this method include a short joint, threaded and coupled, approximately 20 ft. long for landing the casing. Should slip-joint casing be employed, have a threaded collar installed on the last joint to be run and cemented in the well.

Hole is usually drilled so that the casing may be landed with the collar on the last joint extending 3 or 4 in. above the cellar floor. Should an unusually deep cellar be in use or an allowance made for the particular riser nipple being used as a temporary base head, the last joint of casing may be landed at a height for proper installation of the blowout preventer equipment. Where settling or caving of surface sands and gravel may be encountered, 3 to 5 ft. excess hole should be made, so the collar on the top joint may be landed at the proper place.

A minimum of three collars on the bottom joints and the collar on the top joint should be spot-welded.

The cement will usually set sufficiently to release and remove the landing joint within 2 to 4 hours. Use of an accelerator such as calcium chloride or lumnite will assure a fairly rapid initial set of the cement. Top of the cement fill around the outside of the casing should also be checked before removal of landing joint. Should the cement be found to have dropped, be sure to fill the space with a fairly heavy slurry or cement containing an accelerator.

Author is with Union Oil Co. of California. Paper presented at Los Angeles meeting, A.P.I. Division of Production, May 6-7, 1954.

Temporary base head . . . After removing the landing joint, a temporary base head or riser nipple is screwed into the top joint of the surface casing. The riser nipple which is most commonly used is 4 ft. long over-all. On the top is a 12-in. Series 900 flange, with a piece of 13⅜-in. casing approximately 30 in. long, made up in the flange and swaged on the lower end to the size of the casing being used. A straight riser made up of the same size as the surface pipe will usually work satisfactorily, but it has been found advantageous to have the extra clearance for the tubing head when running the water string. It is also more economical to replace the short swaged section when threads become damaged.

Near the bottom of the riser, a 3-in. collar should be welded into place and fitted with a bull plug. This is necessary so the riser and blowout preventer can be cleaned of any excess cement after running and cementing the water string. It is not uncommon to use the same riser nipple for 10 or 12 wells without needing any repairs, such as new threads (see Fig. 1).

To facilitate making up and removing the riser nipple, it is suggested that

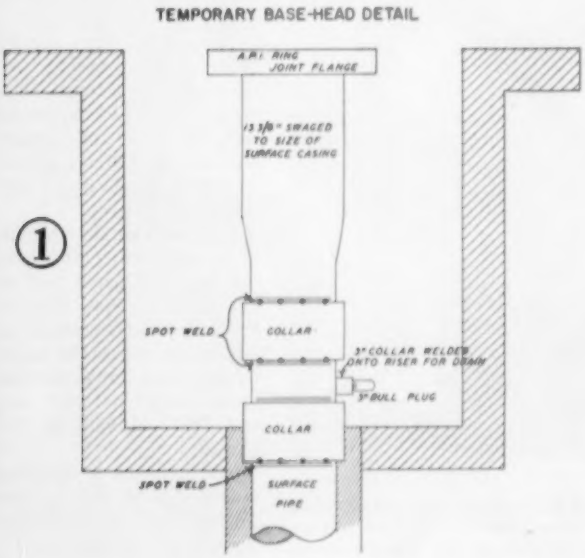
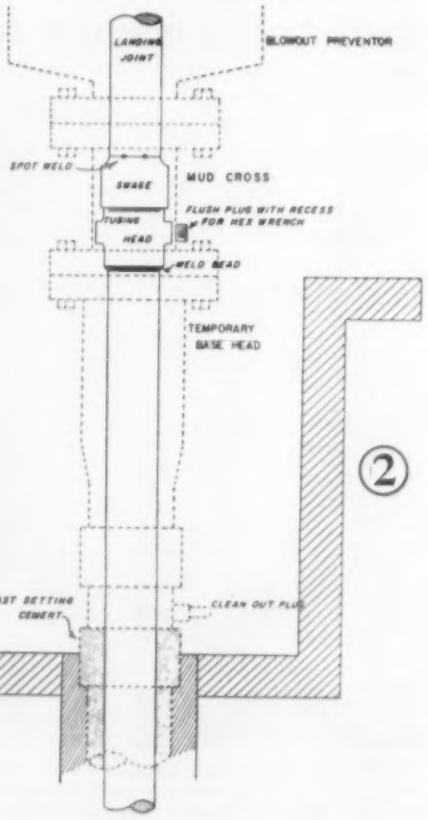


Fig. 1—(Left) Temporary base-head assembly on top of cemented surface casing for mounting of blowout preventer. Assembly is backed off and reused after oil string is run, tubing head mounted, and tubing landed.

Fig. 2—(Right) Water or oil string of casing with tubing head run through blowout preventer and temporary base head, which is removed after well is completed.



a special wrench be built and kept for use at all wells employing this type of landing technique. This wrench should have a companion flange to the one used on the riser nipple. A short piece of 13⅜-in. casing 2 or 3 ft. long, should be made up into the flange and swaged to and installed to a 20-ft. length of heavy 4½ or 5⅛-in. drill pipe. By using three or four bolts, the flanges can be bolted together so the riser can be made up or backed out by using the regular pipe tongs. The blowout preventer or spacer spools as needed may then be flanged up to riser. It is essential that the blowout preventer is tied down securely.

One precaution which should always be observed when installing the temporary base head and spools to connect the blowout preventer, is that it is known where the tubing head will be wanted when the water string is run. Proper allowance must be made so the blowout preventer will be high enough above the tubing head for operation of both the rams and full-closure gate.

Landing water string . . . When ordering the water or oil string, it is suggested that joints of casing measuring 5, 10, and 20 ft. be included, so the tubing head can be landed at the proper height in relation to the casing perforation point where little variation can be allowed.

It is advisable to spot-weld three to five collars on both the bottom and top of the water string.

A tubing head similar in construction to the National Type E or Shaffer Type 49L will probably prove to be the most satisfactory head for this method of landing casing. The top part of the tubing head is made with 8⅝-in. male threads for the 7-in. head, while 10¾-in. threads are used on the 8⅝-in. head. The bottom part has female threads for making up on the casing.

The heads are available, complete with hanger for either a single or multiple string of tubing. A holddown ring for the tubing hanger is also available and recommended for use as an extra safety precaution. This ring is screwed onto the top threads of the head when completing the well. Standard 2-in. outlets will be found on opposite sides of the head.

The tubing head should be made up and spot-welded in place of the collar on a joint of casing, prior to sending to the well. While running the casing, flush plugs should be installed in the tubing head outlets. After making up the plugs, check the greatest diameter of tubing head to be certain the plugs will not keep the head from passing through the pitcher nipple, blowout preventer and riser nipple. The welder can usually trim off any excess without lowering the strength of head or plugs.

The landing joint consists of a joint of casing, usually 15 to 20 ft. long, including a swage made up and spot-welded onto the landing joint. The swage is of the correct size to make up on the top of the tubing head. It is suggested that the length of the landing joint is tailored so the top is about 3 ft. above the rotary table, to facilitate installation of the cementing head.

The distance from the top of the rotary table to the top of the pad and bottom of the cellar must be measured prior to running pipe. When it has been determined at which height the tubing head should be landed at completion of the job, measurements are taken from the tubing head as it is run into the hole and mark made on the landing joint where to stop pipe in relation to the rotary table. If it is essential to have the outlets on the tubing head facing in a particular direction, a vertical mark on the landing joint, in line with the outlets, can be made to facilitate proper alignment (see Fig. 2).

Although it is debatable whether it is necessary to work pipe while cementing, be certain to have the alignment marks in place before pipe becomes frozen too much to move.

Cementing operations are carried on in the usual manner. Following the final cement job on the water string, it will be necessary to put in a good cement job at the top of well in the annulus of the surface pipe and water string. This is used to replace the slips and packing used in the conventional landing head.

There are two easy ways of cementing the annulus with excellent results. One method is to run into annulus with approximately 50 ft. of ½-in. pipe. Pump in water until mud or cement is thoroughly displaced. Mix and pump in a heavy slurry of cement premixed with 2 per cent calcium chloride or 10 per cent lumnite. When good returns are obtained, stop cementing and remove 3-in. bull plug in bottom of riser nipple and cleanout excess cement. Close pipe rams around casing or center casing in rotary table with blocks.

Another successful method commonly employed, is to pump 25 to 50 sacks of treated cement into fillup line, while rams are closed. Displace with enough water to clear blowout preventer and riser nipple. Hold pipe on the hook for 2 to 4 hours, depending on time for the top job to take its initial set. After backing out landing joint, operations can be carried on in the usual manner.

After completion of cleaning out, testing, running and landing tubing, the blowout preventer and riser nipple are removed. Check height of cement in annulus. If it is found below the top, fill with heavy slurry. This is important, as the pipe could move slightly while pumping.

The method is not especially recommended for wildcat wells where several protective strings may be needed or unknown bottom-hole pressures may be drilled.

British Steels Not Inferior in Brittle Fracture Susceptibility

An editorial change in text ("Why Storage Tanks Fail," The Oil and Gas Journal, February 1, 1954, page 73) made after the authors released the manuscript has been generally interpreted as indicating British steels to be inferior to U. S. steels so far as susceptibility to brittle fracture is concerned. The authors did not state "... when British tank-plate steel or equivalent is used in construction of the tanks," and do not believe this to be true. Actually it is their opinion that semiskilled or rimmed steels of the A-7 type are equally susceptible to brittle fracture regardless of source.

The authors would like also to give credit to A. H. Goodger, of National Boiler and General Insurance Co., Ltd., of Manchester, England, for the data on chemical constituents, physical properties, and a portion of the impact data in Tables 1, 2, and 3. Goodger was employed as a consultant by the British tank builders to investigate the failures. These data were checked completely (with the exception of Izod tests) by Standard Oil Development Co. on samples of the steel brought back to the United States. Inadvertently, Goodger's data rather than Standard Oil Development Co.'s were published.

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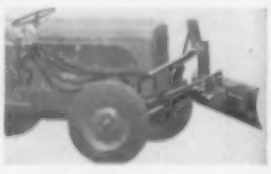

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The Combustion Gas Turbine in Natural-Gas Transmission—1

by Tracy S. Park, Jr.

THE gas-turbine-driven centrifugal compressor appears to be a competitive alternative for gas compression on pipelines. This is demonstrated by the fact that a total of 39 units are presently in service, with one additional machine undergoing installation.

The centrifugal compressor which it drives must be considered an integral part of the system. Progress in the centrifugal compressor art has kept pace with continuing improvements of its prime mover. Eight years ago, the best motor-driven centrifugal compressors did well to attain a compression efficiency of 70 per cent. Today, efficiencies of 83 per cent are being guaranteed by the manufacturers of such equipment, and tests have indicated that efficiencies in the range 85-86 per cent have been realized in some cases. During substantially the same period, pipeline gas-turbine thermal efficiencies have increased from approximately 16 per cent to 27.5 per cent. Reliability of operation of both the gas-turbine driver and the centrifugal compressor has apparently maintained pace with gains in efficiency. It now appears that the combination has attained the same degree of dependability as the modern high-pressure steam turbine. Experience has demonstrated that operating labor requirements and installation costs compare favorably with conventional reciprocating compressor equipment. Maintenance costs will remain an unknown quantity until the machines now installed build up sufficient operational time to make a determination possible.

First Gas Pipeline Application—Simple-Cycle, Single-Shaft Unit

The pioneer installation of a gas-turbine-driven centrifugal compressor was a joint effort between Westinghouse and Ingersoll-Rand, supplying the turbine and centrifugal gas compressor respectively, and Mississippi River Fuel Corp. It was installed at Wilmar, Ark., as an experiment in May 1949 on the gas company's 22-in. pipeline connecting Monroe, La., with St. Louis. In January 1951 the unit was reinstalled on the company's system at Bonne Terre, Mo., south of St. Louis.

Author is mechanical engineer, Tennessee Gas Transmission Co. Paper presented at N.G.A.A. meeting, Dallas, 1954.

Second Gas Pipeline Application—Simple-Cycle, Dual-Shaft Unit

In the spring of 1952, Tennessee Gas Transmission Co., in a joint venture with Clark Brothers, began testing the open-cycle gas turbine installed at T.G.T.'s Morehead, Ky., compressor station. This marked the second combustion gas turbine to go into gas-pipeline service in this country and the first simple-cycle, two-shaft machine. It is a regenerative unit with 10 stages in the axial compressor and 2 turbine stages. The high-pressure stage drives the axial compressor and the low-pressure stage yields the net output to the centrifugal pipeline compressor. The Clark machine is of the general type made by other manufacturers, which is now appearing on the gas-pipeline scene. One pronounced difference is the existence of only one combustion chamber, which is nonintegral with the turbine proper. Other manufacturers of stationary pipeline units have adopted the use of multiple, small combustors arranged circumferentially around the machine.

Two-shaft, regenerative gas turbines for pipeline service are currently being manufactured by three companies in the United States. The cycles of operation are all similar. However, they differ in the number and type of combustion chambers employed, style of regenerator, arrangement and type of auxiliaries, maximum turbine inlet operating temperature, speeds of the two shafts, and in other structural and arrangement details.

First Large-Scale Pipeline Applications

El Paso Natural Gas Co. departed from conventional gas-pipeline reciprocating compressor station installations by planning the first large-scale use of gas-turbine-driven centrifugal compressors.

El Paso presently has 10 gas-turbine-driven compressor stations on its system. Eight of these plants have three machines each, and two of the plants have two machines each, or a total of 28 turbines altogether. The first of these units, located at Cornudas, Tex., commenced operation on December 20, 1952, and had operated a total of 7,781 hours as of February 15, 1954. The last unit to be installed commenced operation on October 21, 1953, and has logged 1,912 hours as of February 15. The gas turbines on El Paso's system were designed and manufactured by General Electric Co. They are two-shaft, regenerative machines.

Other Pipeline Gas Turbine Installations

Nine additional gas turbines have commenced operation during the last year, and are all identical to those on El Paso's system. The owners and total hours' operation as of February 15, 1954, are as follows:

Company and number of units—	Hours
Atlantic Seaboard:	
Seneca, W. Va., station (1)	2,099
Southern Counties:	
Cactus City, Calif., station (1)	4,366
Desert Center, Calif., station (1)	3,717
United Gas Pipeline:	
Napoleonville, La., station (1)	1,882
Northern Natural:	
Tescott, Kans., station (No. 1)	910
Tescott, Kans., station (No. 2)	916
Tescott, Kans., station (No. 3)	218
Macksville, Kans., station (No. 1)	655
Macksville, Kans., station (No. 2)	558
Macksville, Kans., station (No. 3)	(*)

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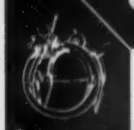
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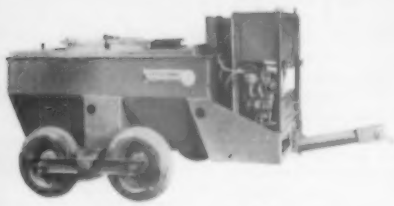
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SPECIALIZED EQUIPMENT FOR THE PIPELINE INDUSTRY

Low-Temperature Fractional Analysis—4

by J. F. Wilson

THE continuous cooling method in low-temperature analysis was described in the preceding installment.

It should be mentioned that the cooling method as finally evolved at the N.G.A.A. school appeared to improve the sharpness of fractionation over that which would be expected from the elimination of liquid hold-up and some steadying of the column operation. The column appeared to run quite lean; that is, less liquid reflux was in the column than is normally observed. At the same time the breaks between components were sharper than normally obtained. Exactly why the column separating efficiency was improved by the change in the cooling is not known at the present time.

The adaptation of this method of column cooling to equipment other than the Podbielniak apparatus is not straightforward. The C.N.G.A. column, for example, uses the outer wall of the distilling tube as the inner wall of the vacuum jacket, so there is no annulus between the distilling section and the vacuum jacket through which to lead the cold vapor. However, the method described above and used at the school was quite effective. It might be desirable to modify other types of distillation equipment to allow this type of cooling to be used.

One other change made in the Podbielniak equipment at the school that increased the efficiency of separation was the addition of a second thermocouple about 1 in. down into the packing. This thermocouple and the normal top thermocouple were both wired to the recorder through a commutating switch. The switch operated so that the top thermocouple was recording two-thirds of the time, the lower thermocouple, one-third of the time. The lower thermocouple activated the temperature rise circuit in the recorder before the temperature rise reached the top thermocouple. Thus, the distillation was automatically slowed down before the break between components reached the top of the column. This feature was particularly helpful in obtaining sharp breaks on the isomer separations.

Author is research engineer, Union Oil Co. of California. Paper presented at C.N.G.A. meeting.

Manometer errors . . . On the fully automatic Podbielniak apparatus the one leg of the receiver manometer forms a boundary of the receiver volume. Because this leg of the manometer travels as the pressure rises in the receivers, the receiver volume is actually a variable. Podbielniak has put in the receiver leg of the manometer a metal wedge that distorts the mercury travel in the measured leg of the manometer to compensate for this change of receiver volume.

However, the dimensions of the wedge were calculated to compensate only when the distillation is proceeding into a 1 gal. receiver. When the distillation is proceeding into a receiver of any other volume, the compensation is not exact and must be corrected. Corrections for use with receivers other than 1-gal. have been worked out by Preston and are now available in the literature[1].

Another manometer error that sometimes causes inaccuracies in distillation analyses is the neglecting of the effect of temperature on mercury density. One atmosphere of pressure or 14.696 psi. is equal to the pressure exerted by a column of mercury 76 cm. high only when that mercury column is at 0°C. Consequently, in order to obtain true pressure units from a mercury manometer, corrections must be made for the variation of mercury density with temperature.

Assuming a normal room temperature of around 75° F., the correction factor to the observed reading of a mercury manometer is 0.9957. When the entire analysis is completed in the distillation column, the units of pressure are unimportant because they will all be on the same relative basis. However, if there is a liquid residue from the distillation, absolute pressure units are required to combine the residue with the distillate in computing the complete analysis.

Molecular-weight determinations . . . As a part of the analysis of certain hydrocarbon mixtures, it is necessary to determine the molecular weight or vapor liquid equivalent of the residue from a distillation. The method used at the school was the same as that developed earlier by Preston and reported in the literature[2]. Some difficulty was encountered in getting good reproducibility with the method as it exists. The method is such that a great deal of operator skill and experience is required in obtaining accuracy and reproducibility. However, at the present time Phillips Petroleum Co. is working with the method and modifying the sample introduction system. This will probably increase the ease of reproducibility of the method. However, the method as used at the school did not appear entirely satisfactory because of its heavy reliance upon operator skill and experience.

Reanalysis techniques . . . Because of the school's success in eliminating liquid hold-up and measuring the vapor holdup in the automatic distillation equipment, little emphasis was placed on what are usually called reanalysis methods for improving the analysis. However, brief discussion and a demonstration were included on the vapor-pressure method developed and used by Phillips[3]. Some discussion was held on the use of the thermal conductivity measurements for reanalysis purposes.

The idea of the reanalysis techniques is to measure, either continuously or batchwise, by some auxiliary means, the composition of any unary or binary mixture produced by the distillation column, particularly the composition of break fractions between components, to increase the analytical precision. Usually the break fractions produced in a distillation are collected in a separate receiver, and the reanalysis method is applied to this receiver to determine its composition. In this way the problem of determining the exact break point between components is eliminated. The opinion at the school was that the analytical results obtainable with the modified fully automatic distillation apparatus were accurate enough so that reanalysis techniques were unnecessary.

References

1. Preston, S. T., Petroleum Refiner 32, No. 8, 109 (1953).

2. Preston, S. T., Petroleum Engineer, 24, No. 10, C 34 (1952).

3. Smith, D. E., Proc. N.G.A.A. Seminar on Low-Temperature Fractional Analysis, Fort Worth, Tex., March 15-16, 1951, pp. 30-36.

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Basic Principles of Thermal Cracking

"What are the main patent features of thermal cracking? What has happened to the many trade-name processes of a few years ago?"—P.B.

Just what the patentable features are cannot be stated with certainty because about 4,000 patents have been issued and there most surely are not more than a few inventions. Furthermore, the validity of scarcely any of the patents has been established by litigation, and the decisions arrived at in some of the litigations is subject to doubt. David McKnight, Jr., in August 1938, published through the University of Texas Press, his "A Study of Patents on Petroleum Cracking." It is still the most complete study. He was bold enough to state 10 basic principles. These are reviewed here along with five features that seem also to be truly inventive. The first 10 are McKnight's features:

1. Pressure—Dubbs 1123502 and Burton 1049667 are said to disclose the use of pressure but at least six earlier patents are also said to be significant.

2. Continuous or tube operation—Continuous circulation is disclosed in Trumble's adjudicated Patent 1281884 although an early (1891) Russian patent may also be significant.

3. Clean circulation—The current removal of high-boiling unsaturated material produced by the primary decomposition reactions is thought to be vital in the avoidance of coke in the tubes.

4. Unheated reaction zone—Coke tends to form on the walls of heated tubes, so conduct the reaction in an unheated reaction zone. The Roy Cross Patent 1423500 was held valid in court.

5. Selective cracking—The best operating conditions for low-boiling feed stocks are altogether different from those for a very high-boiling stock. Accordingly, split wide-range stocks into several short ranges. Egloff's 1537593 has been held valid.

6. Uni-coil injection—An easily cracked stock can be introduced toward the outlet of a coil which is operating on a refractory or hard to crack stock. Thus, one coil can serve to selectively crack two materials.

7. Quenching — Cracking occurs most rapidly at the outlet of the reaction zone where the concentration of unsaturated (coke-forming) materials is highest. Accordingly, quench the reaction products to halt further reaction. Gasoline Products Co. apparently acknowledges Donnelly's 1712789 although Weaver (1601786) may have been the first to apply quenching commercially.

8. Short residence time and reaction chamber—Liquid, because of its small volume compared with vapor, tends to be cracked too long. Accordingly, a low level is maintained to shorten the time of cracking of the liquid. Downflow reaction chambers are a further development of this principle.

9. Furnace designs — Where to draw the line on equipment or apparatus is never clear, but McKnight appears to consider only furnaces. Perhaps equipment should not be considered as basic, at least not as a basic principle.

10. Time of reaction—McKnight chooses to call this "Coking in the Reaction Chamber," but it seems to embrace the broader concept of time. During short reaction times, the reactions are mainly ones of decomposition whereas at longer times, polymerization or condensation of reactive products occurs. Thus, coking necessitates producing olefinic materials followed by enough time to cause extensive polymerization. The so-called thermal polymerization processes involve exactly the same principle but are applied to the decomposition of gas-like feeds and the polymerization of olefinic materials by providing more time into products of the gasoline boiling range.

To these might be added:

11. Temperature—Cracking is initiated in petroleum hydrocarbons at temperature of 680° F. The rate is slow at 680° F. and very much more rapid at high temperatures.

12. Liquid phase—Cracking can be conducted in the liquid phase if the critical temperature of the charge stock is higher than the cracking temperature that is employed. If very much higher, the pressure can be atmospheric or even subatmospheric (Nelson 1990664) but a high pressure is required for most stocks.

13. Vapor phase—This is the converse of (12). Vapor-phase operation usually requires a relatively low pressure but a high pressure can be employed if the critical temperature of the feed stock is very much lower than the cracking temperature, especially if it is also below 680° F.

14. Single phase—In a liquid-phase mixture, the liquid tends to settle out or accumulate on heating surfaces such as tubes and thereby be overcracked into coke. Means of preparing either a totally liquid phase or a mist-free vapor phase before exposure to cracking conditions are disclosed in many patents.

15. Pseudohomogeneous phase—The tendency to form coke in a mixed phase can be alleviated by the use of such a high reaction pressure that the liquid mist scarcely tends to separate from the dense vapor.

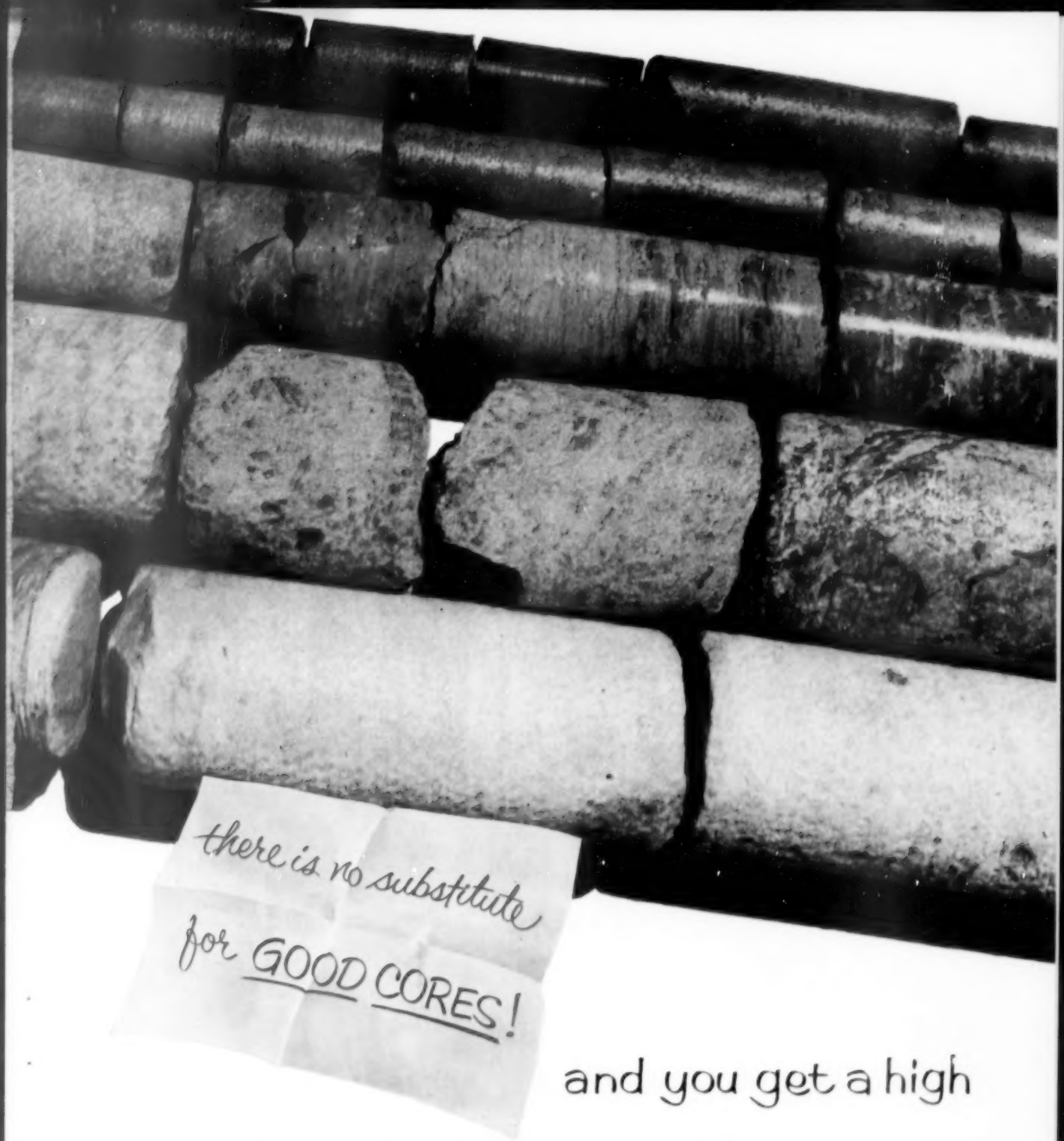
Undoubtedly other features could be classified but these seem to be of greatest commercial significance.

Crude Distillations by A.S.T.M. Method

"I am trying to locate the typical A.S.T.M. distillation curves for the common crude oils of the United States. Where might I obtain such distillations?" E. R. G.

The A.S.T.M. method (D-285) has probably not been widely used. However, it provides distillation curves and yield information that is very similar to the results obtained in the U. S. Bureau of Mines Hempel distillation. Thousands of crude oils have been analyzed by the Bureau of Mines and these analyses are suggested for purposes of comparison.

The relationship between the vapor temperatures obtained in a Hempel distillation and the true or actual boiling points of the hydrocarbons contained in the oil is not precise, but the general situation is indicated on the Questions on Technology page of September 1, 1952, p. 117.



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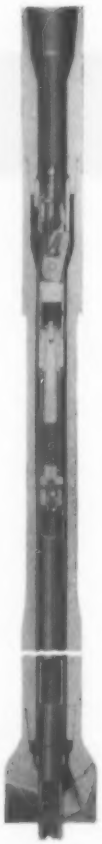

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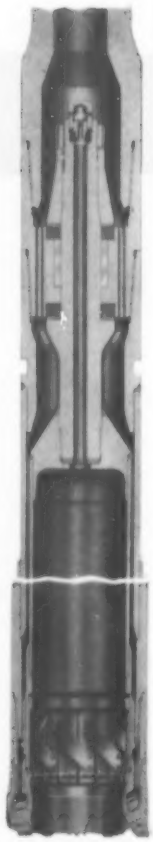

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How Mud Invasion Affects Spontaneous Potential

by R. I. Martin

IN order to follow the effects of invasion the electrochemical components of the S.P. will be considered first, because they are of greater magnitude. Penetration of the mud filtrate has an effect on the S.P. deflections, similar to an increase in hole diameter. The equivalent hole diameter, however, becomes appreciably smaller than the diameter of the invaded zone, as the resistivity ratio Rt/Rm increases.

The effects of invasion are shown by the S.P. curves in Fig. 1 for resistivity ratios 1, 6, 21, and 101, and for beds of thickness d, 4 d, and 16 d. These are again calculated curves with the assumption that the resistivity of the invaded zone Ri is equal to the other formation resistivities.

The maximum deflection of the S.P. curve for the case Rt = Rm varies as if the hole diameter were increased to di, in a case of no invasion.

For a larger resistivity ratio, however, the maximum deflection is affected as if the equivalent hole diameter were larger than the hole diameter, but appreciably less than the diameter of invasion. For example, when Rt = 101 Rm, a permeable bed of thickness 4 d invaded to a diameter of 8 d, gives a peak of approximately the same amplitude as either (1) a bed of the same thickness, without invasion but with a hole diameter of 2 d, or (2) a bed of thickness 2 d with a hole diameter of 1 d.

The shape of the S.P. curves is also affected by invasion. The dash lines on Fig. 1 for the case Di = 8 d show that the peak is wider than for the case of no invasion. Curves for the other cases considered are intermediate between these two.

Invasion has the corresponding effect on thin shales in thick sands. That is, the depressions caused by them, are shallower and more rounded.

The part of the S.P. which is due to electrofiltration is little changed by invasion, because the electrofiltration emf remains across the mud cake, at the wall of the bore hole. For this reason, if the electrofiltration emf contributes a substantial portion of the total, the over-all invasion effect is less pronounced.

Fig. 2 shows an example of the changes in S.P. effect resulting from invasion. The changes on the resistivity logs should also be noted. Some invasion is present on run 1, but it is not enough to affect the long normal curve. On run 2, the normal resistivity has increased, and the long normal is now affected by invasion, which has increased in depth.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

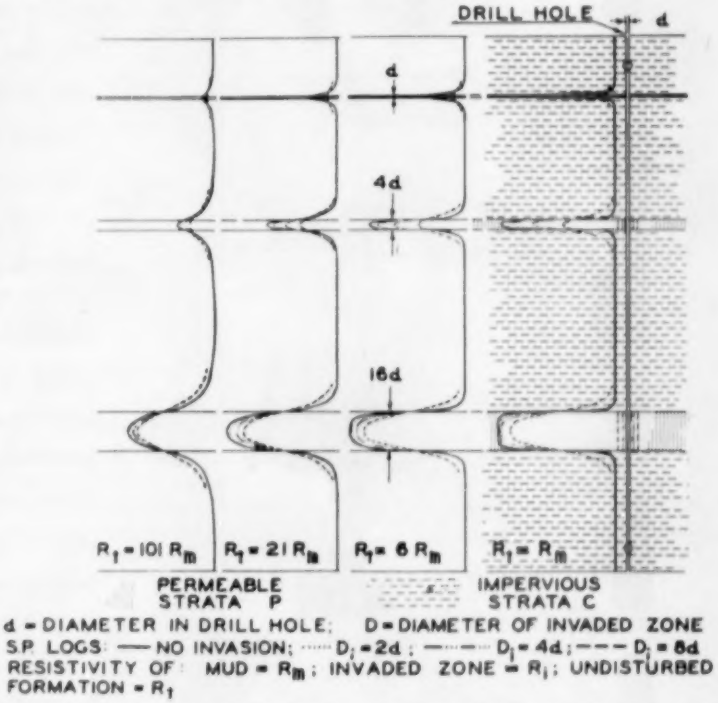
DRILL HOLE
d
4d
16d
$R_t = 101\ R_m$
$R_t = 21\ R_m$
$R_t = 6\ R_m$
$R_t = R_m$
PERMEABLE STRATA P
IMPERVIOUS STRATA C
d = DIAMETER IN DRILL HOLE; D = DIAMETER OF INVADED ZONE
S.P. LOGS: — NO INVASION; ····· $D_i = 2d$; —·—·— $D_i = 4d$; – – – $D_i = 8d$
RESISTIVITY OF: MUD = R_m; INVADED ZONE = R_i; UNDISTURBED FORMATION = R_t

Fig. 1—The effect of mud invasion on the self-potential log. From Doll, H. G., "The S.P. Log: Theoretical Analysis and Principles of Interpretation." A.I.M.E. T.P. 2463, September 1948.

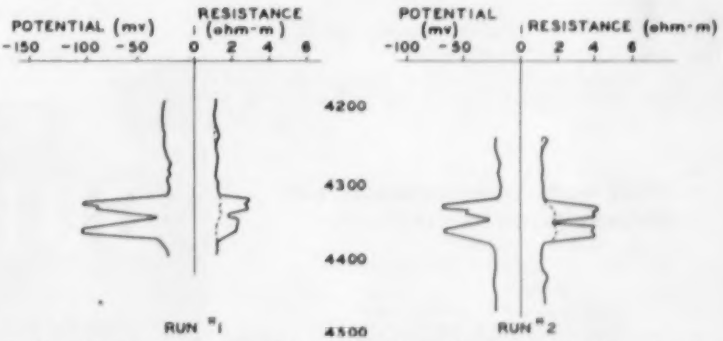

Fig. 2—A field example of the changes in self-potential effect resulting from invasion. From "Electric Well Logging," a copyrighted manual by Hubert Guyod.

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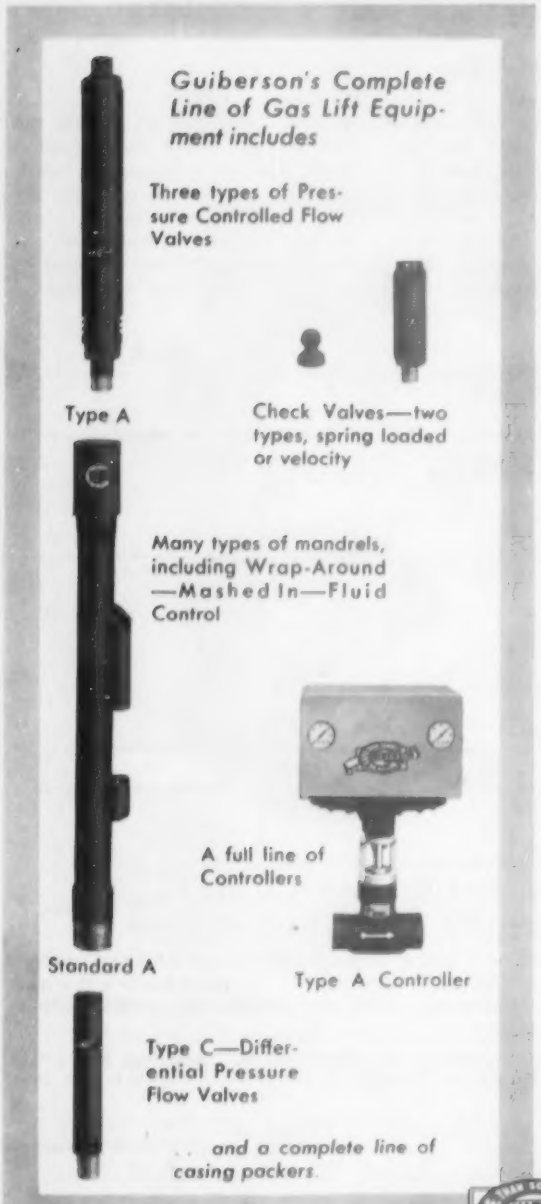
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2,168,066	2,330,107	2,305,350	2,350,944	2,411,315
2,186,668	2,371,830	2,340,028	2,361,718	2,519,242

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Likewise, in the effect of tubing temperatures, the Class II is superior but carries with it the disadvantage of the effect of bulb elevation on the reading. This, however, can be corrected by a simple zero adjustment.

Obviously, all the above bulb requirements cannot be had in any single metal or design. Consequently, for commercial manufacture, it is necessary to choose the most important features for a wide range of applications. The undesirable features are minimized as much as possible by proper design.

Common metals such as copper, brass, steel, etc., while not ideal in every respect, are generally used in bulb construction.

What to specify . . . If, however, the conditions of use are known, the combination of design, material, and filling medium, which will give optimum measuring results, often can be selected. For this reason, it is important, when specifying a thermometer for a particular application, to list ambient temperature span, operating temperatures, range, bulb location, and any data which will influence bulb dimensions. Such data are pipe size, physical clearances, line pressures, and fluid velocity.

There is often little or no choice of materials or dimensions for the bulb, due to corrosive or other unalterable conditions. Then the ingenuity of the design engineer makes the difference between a bulb that is practical and one that is hopelessly inadequate.

Bulb extension . . . The function of the bulb extension is primarily to thermally isolate the sensitive portion from the equipment to which the bulb is attached. If the sensitive portion is not adequately insulated, much of the heat may flow between the bulb and the bulb mounting. Then the temperature of the filling fluid will be influenced by the temperature of the bulb mounting—and error will result. Therefore, the extension should be made of material that is a poor heat conductor. The bulb extension also assures complete immersion of the sensitive portion in the medium to be measured.

In additon, the material of which the extension is made must be strong and corrosive resistant through the range of tempertures in which it is used. The extension should be designed so that most of the surface area of the bulb is concentrated in the sensitive portion and as little as possible in the extension.

The bulb connector is simply a means of fastening the bulb to the tubing armor.

Author is manager, educational department, Bristol Co., Waterbury, Conn. Paper presented at University of Florida symposium on industrial instrumentation, 1954.

Capillary Tubing

The capillary tubing is that part of the thermal system which provides communication between the sensitive portion of the bulb and the measuring element. ("A capillary is a tube of very fine internal diameter.") Note that one end of the capillary tube is soldered into the sensitive portion and the other end is soldered into the measuring element, to form an inseparable, closed system. A thermometer capillary tubing must never be cut or broken in any way. To do so will make the system completely inoperative.

Capillary tubings used in filled-system thermometers have internal diameters from about .06 to .028 in. This very small capillary is used to minimize the volume contained in the tubing. As explained above, the maximum part of the system volume must be in the bulb.

However, capillary of less than .010 in. i.d. will retard response, be difficult to fill properly with fluid, and be likely to plug with foreign matter.

Basic requirements . . . Capillary tubing for use in filled-system thermometers must meet the following basic requirements:

1. The i.d. must be relatively uniform to minimize variations in tubing volume.
2. The internal surface must be as smooth and clean as possible to minimize friction and possible plugging. Any retardation of filling fluid flow due to such friction, slows down the speed of response of the thermal system.
3. The tubing must be mechanically strong and pliable, yet must not crack, split, flatten, or expand under pressure.
4. The metal of which the capillary is made must be chemically inert to the filling fluid.
5. The metal must not contaminate the filling fluid by disintegration.

Copper, steel, and stainless steel are the most practical metals for thermal-system capillary tubing.

The choice of metal for the capillary and of material for the armor depends on the particular conditions in which the thermometer will be used. The internal diameter of the capillary depends on the length of tubing required, the filling fluid used and the ambient temperature span.

Filling Fluids

The filling fluid is the active part of the thermal system. Its volume and pressure changes in response to heat changes generate the force that actuates the measuring element. This force results from the increasing and decreasing velocity of the molecules in the fluid that occurs with temperature changes.

In most thermal systems, the filling fluid has two distinct functions:

1. It reacts to heat at the bulb.
2. It transmits this reaction to the measuring element.

Any one of a wide variety of fluids can be used for filling thermal systems. These fluids are commercially available and have well known characteristics. The filling fluid can be used in the liquid, vapor or gaseous state, or in a combination of these states, depending on the conditions of use and desired metering characteristics.

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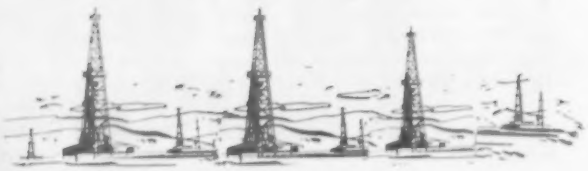

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Mud Pressures in Running Casing

by George S. Ormsby

THE ratio of pipe diameter to annular diameter is usually much higher for casing than for drill pipe, creating tremendous pressure surges in deep holes. Bottom-fill devices have been developed as a result of deep casing problems, but their downhole operation generally has not been clearly understood.

Fig. 1 graphically illustrates the behavior of a differential-pressure-fill shoe (or collar) operating under the conditions of Table 1. The solid-line curves are true curves for the conditions and were calculated by trial and error.

TABLE 1

Casing size:	
Outside diameter, in.	9.625
Inside diameter, in.	8.72
Length, ft.	10,000
Hole size:	
Inside diameter, in.	12.50
Length, ft.	10,000
Mud properties:	
Density, lb. per gal.	15
Plastic viscosity, cp.	35
Yield point, lb. per 100 sq. ft.	15

Author is with Phillips Petroleum Co., Houston. From a paper presented at A.P.I. Division of Production, southwestern district meeting, Houston, March 3-5, 1954.

If the device were a constant 81 per cent fill shoe, which is impossible, the instantaneous bottom-hole pressure would follow the dotted curve. The dogleg in the per cent fill curve is caused by annular mud passing into turbulent flow, causing the inner mud surface to rise rapidly to equalize total head. At a slightly higher speed, the mud inside the casing passes into turbulent flow, lowering the rate of per cent fill increase.

With decreasing hole size, the per cent fill line would shift upward, as it would also with higher-viscosity muds. The running pressure surge at any velocity will be a function of depth, but the per cent fill with this device will be a function of velocity independent of depth if diameters and mud properties remain constant.

It is necessary to assume a frictionless device with no difference in seating and unseating pressure differential to make these calculations. Whether or not these are true assumptions, it is interesting to note that if one or two joints of casing are run at 5 ft. per second the fill will increase to 87 per cent. If the running speed is then dropped back to less than 4 ft. per second, the fill will decrease below 84 per cent.

Since the value will not permit mud to flow downward, the mud surface inside the casing must remain stationary in relation to the casing until pressures are balanced at 84 per cent fill, or until running speed is increased. This would normally result in alternate fill and float, but no harm is theoretically done, as the valve should open if the bottom-hole pressure starts to rise over the bottom-hole pressure at last filling.

For comparative purposes, the two extremes of casing fill and a differential pressure fill device are graphed in Fig. 2. The ultimate reduction shown here can be reduced further by allowing the mud to flow up through the casing onto the rig floor, but the result was not thought worth plotting. The spread between these curves will be increased as pipe to annulus diameter ratio is increased and as mud properties increase, and vice versa.

The next installment will discuss the effect of hole size when running casing.

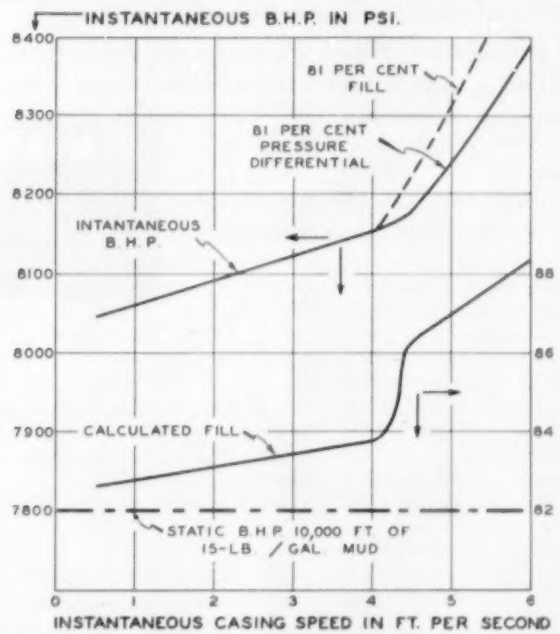


Fig. 1—Calculated example of behavior of 81 per cent differential pressure fill shoe.

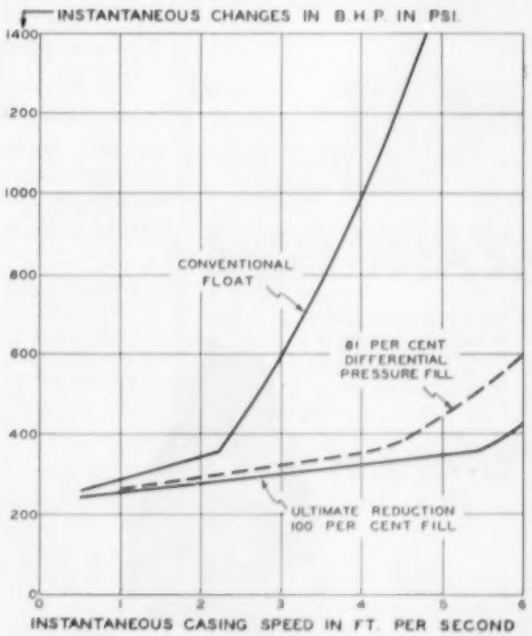
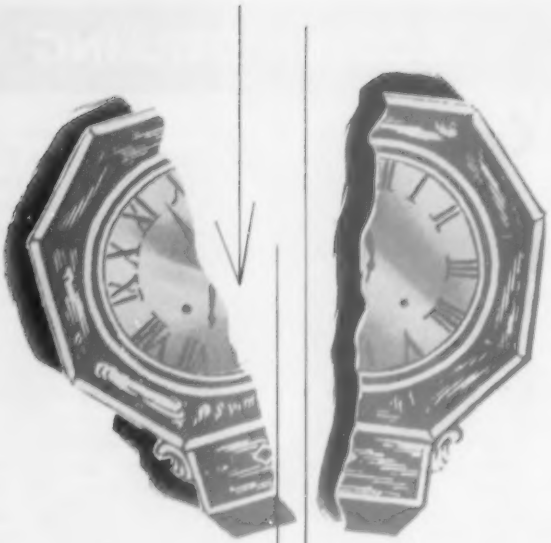


Fig. 2—Calculated comparison of 81 per cent pressure differential fill with conventional float and ultimate pressure reduction.



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Among the Drilling Contractors

Delta Companies Report Three New Drilling Jobs

Delta Drilling Co., and its associated company, Delta Gulf Drilling Co., Tyler, Tex., report three new operations getting under way, two being contract jobs and the other a company account.

New contract jobs are Humble Oil & Refining Co. 8 Habetz, in the North Crowley area, Acadia Parish, Coastal Louisiana, to be drilled by Delta Gulf Drilling Co., and Sun Oil Co. 4 Hitts Lake, in Hitts Lake field, Smith County, East Texas, to be drilled by Delta Drilling Co.

The new company account operation is Delta Gulf Drilling Co. 2 Sparks, a 5,500-ft. reef test in Nenney field, Stonewall County, North Central Texas.

Delta Drilling Co. also reports a new Strawn sand well, a joint operation of its own and Ashland Refining Co., being completed in Jameson field, Coke County, West Central Texas. The well is 2 Whitt, perforated in 46 ft. of pay at 6,100 ft.

It also has a new Pettit gas-condensate well of its own at 1 Burson unit, in Sibley field, Webster Parish, North Louisiana. The well, drilled to 6,795 ft., is perforated at 6,700-25 ft.

Delta Drilling has a possible sub-Clarksville discovery well at its 1 Sanders, a wildcat in Jose Pineda Survey, 4 miles northwest of Jacksonville, Cherokee County, where it is planning to test showings found in sidewall cores around 4,950 ft. Total depth is 5,585 ft.

Bankhead Drilling Co. has taken a contract for a 10,700-ft. test to be drilled for Regan Oil Co., of Corpus Christi, in the Sunshine area, Iberville Parish, Louisiana Gulf Coast. Location is for 1 Rene LeBlanc et al., in 4-9s-1w.

Stanford Drilling Co. has a new contract job under way for Stansbury & Webb, of Bakersfield, Calif., at 1 Spanne, in 16-6-35, 5 miles southwest of Lompoc, in Santa Barbara County, California.

Santa Maria Drilling Co., Long Beach, Calif., has taken contracts for two additional wildcat tests, one to be drilled for Union Oil Co. in northwestern Kern County, and the other for Sunray Oil Corp. in Santa Barbara County. The Union test is 63-29 Seaboard-Saunders, in 29-25-2n, northwest of Lost Hills field. Sunray's test is 1 Stow, in 7-4-28, 2 miles northwest of Goleta.

New Drilling Company

Doc Drilling Co. is a newly formed contracting firm operating in the Illinois basin area. N. Y. (Nobe) Dowell is owner, and Clyde Mulligan, tool pusher. Offices are at Mount Vernon, Ill. The company is starting with a new Cardwell T-170 rotary rig.

Gene Reid Drilling, Inc., Bakersfield, Calif., is keeping a rig under contract to Margaret V. Kahler on development work in Morales field, northwest of Chalk Mountain in Cuyama Valley, Santa Barbara County, California. The rig now is being moved to this operator's third location.

Crawford Drilling Co., Shreveport, is starting another lower Cretaceous well for Gulf Refining Co. in the Pearl River County sector of Pistol Ridge field, southern Mississippi. New operation is at 1 Nelson-McKinney unit, in Lot 1, 3-1s-14w.

Gilger Drilling Co., Houston, is rigging up to drill another Tweedel sand outpost test for Pan American Production Co. in the Shuteston area, St. Landry Parish, South Louisiana. Location is for 1 Boudreaux, in 2-8s-3e, on the northwest side of the field, where Tweedel sand was found productive as a new-pay discovery.

Fortenberry Drilling Co., Natchez, Miss., has moved a rig to wildcat location 2 miles southeast of Levees Creek field, in southeastern Adams County, Mississippi, for a 7,200-ft. Wilcox test to be drilled for Calto Oil Co. and G. W. Gulmon.

Hinkle Drilling Co., Houston, is under contract for a 10,500-ft. test Fifteen Oil Co. has projected for the Charenton area, St. Mary Parish, South Louisiana. The test is 25 South Coast, in 32-13s-10e.

Justiss-Mears Drilling Co., Jena, La., has contracted to drill two wells for **Barnett Serio Drilling Co.,** Natchez,

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Miss. Both will be in Adams County, Mississippi, one at Levees Creek, and the other at Moorland. Both will go to the Wilcox with contract depths of 6,800 ft.

Western Service Drilling Co., Inc., Longview, Tex., is under contract for a 14,500-ft. Devonian test 13 miles northwest of Lovington, in Lea County, southeastern New Mexico. The test, 1 Woodward, in 24-14s-35e, will be drilled for Blackwood & Nichols. It is 8 miles from nearest production.

Del Mar Drilling Co., Corpus Christi, is starting a 10,500-ft. wildcat test for Seaboard Oil Co. at 1 Szalwinski, in Luis Menchaca Survey, a mile northeast of Falls City, in Karnes County, South Texas. Location is about a mile southeast of Falls City field, where production is from 13 sands at depths ranging from 4,180 to 6,100 ft.

Big Chief Drilling Co., Oklahoma City, is on Tide Water Associated Oil Co.'s third Smackover deep test in New Hope field, Franklin County, East Texas. Tide Water's recently completed second test has just confirmed the discovery of Smackover production made early this year in the first deep test. The new operation, 1-D Campbell unit, is projected to 13,000 ft. Location is 11 miles southeast of Mount Vernon.

Carl Short, Inc., Houston, will do the drilling on Pure Oil Co.'s new Gulf of Mexico wildcat test in Block 89, East Cameron area, 30 miles from land off the coast of Cameron Parish, Louisiana. Contract objective is 11,000 ft.

Southern Production Co., Inc., Fort Worth, and **Loffland Brothers Co.,** Tulsa, split on two new drilling contracts awarded by California Co. Both contracts are for water-located jobs in Plaquemines Parish, Coastal Louisiana. Southern will drill 1 State Lease 2449, a projected 9,000-ft. well in Main Pass Block 33 area. Loffland will drill 1 Armstrong, an 11,000-ft. test in Dixon Bay area.

Baker & Taylor Drilling Co., Amarillo, Tex., is under contract to Sun Oil Co. for a rank wildcat test to be drilled in northwestern Cimarron County, Oklahoma. Location, on a state lease in 24-6n-3eCM, is 6½ miles west of Garrett. It is only 2½ miles from the Colorado line and 18 miles from the New Mexico line. Nearest production is in the Keyes area, 27 miles to the southeast, on the eastern side of the county. Contract depth is 7,000 ft.

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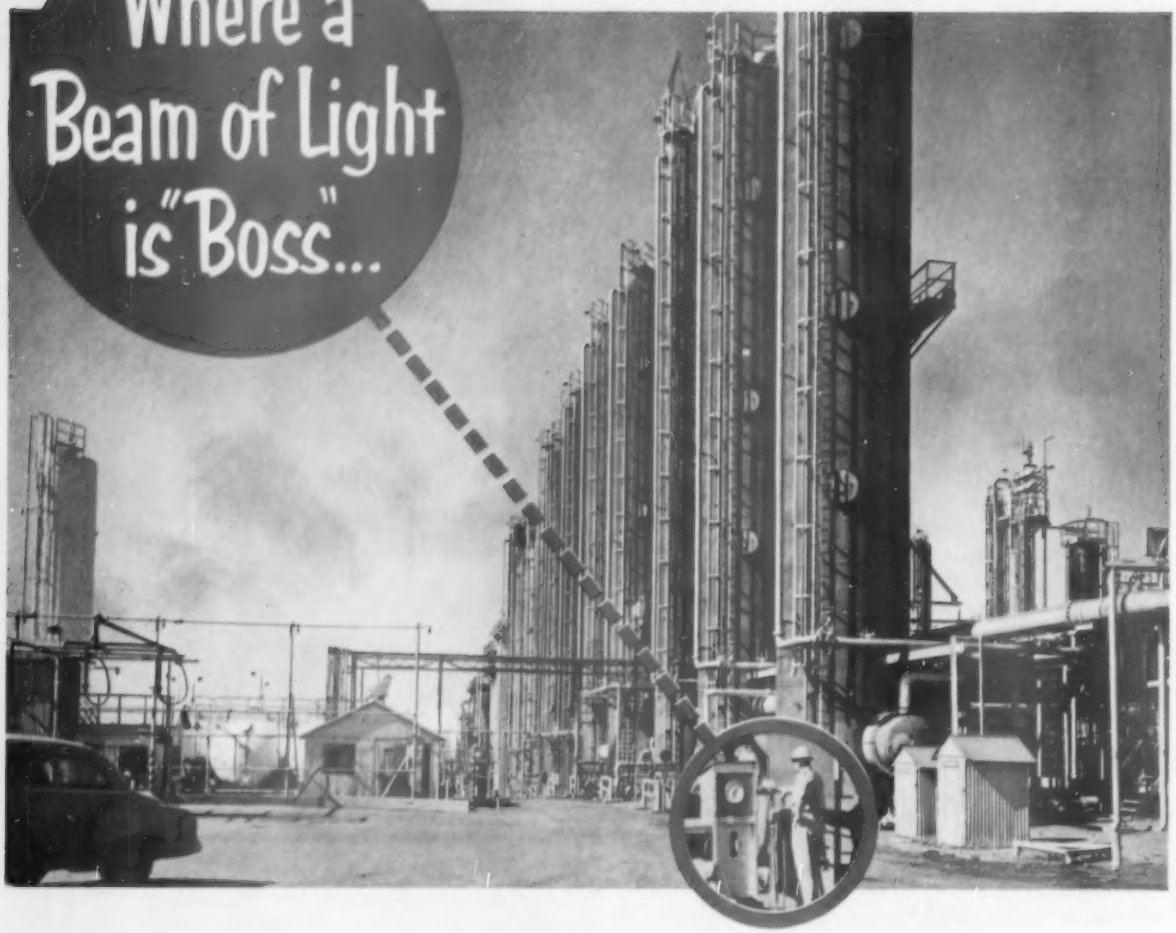

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REFINING

Tank-Failure Report

A.P.I. committee concludes there's no cause for alarm

NEW YORK.—Oil-storage tank failure is serious but its occurrence has not reached dangerous proportions, an American Petroleum Institute study shows.

The survey was undertaken by an A.P.I. committee 2 years ago when several tank failures in England and Canada caused alarm.

Questionnaire returns showed that of 6,000 tanks in the United States exceeding 55,000 bbl., partial failure had occurred in 23. All failed in the lowest course and 20 were riveted tanks erected before 1925.

Nine failures were listed as complete and six of these were in tanks thought to have been erected before 1925.

The average loss was $90,000 and the maximum was $500,000. The committee reported that failures to date seem largely to have been the result of the chance combination of several factors, only a few of which are known or understood.

However, of the 32 failures, 31 occurred during the winter months, November to March. And only the Gulf Coast and California were exempt from these mishaps.

The report was delivered by C. H. Samans of Standard Oil Co. (Ind.) at the recent A.P.I. Refining Division meeting at Houston.

Companies Receive Rapid Writeoffs for Expansion

WASHINGTON.—Refining facilities represented a big chunk of the latest list of government tax amortization allowances.

Largest quick writeoff went to The Texas Co. for 45 and 65 per cent of portions of $11,400,000 it will spend at its Port Arthur, Tex., refinery.

Aurora Gasoline Co. received a 15 to 65 per cent writeoff on $5,365,000 to expand its refining capacities in Michigan.

The allowances permit the companies to write off new facilities in a 5-year period instead of the longer period usually required by the Government.

Naph-Sol Awards Contract

MUSKEGON, Mich.—Naph-Sol Refining Co. has awarded a contract to Southwestern Engineering Co., Los Angeles, to erect a 1,000-bbl. Plat-

Kellogg Begins Work on Continental Coker

Foundation construction has started on the 12,500-bbl. delayed coking unit being built by the M. W. Kellogg Co., engineering-contracting subsidiary of Pullman, Inc., for Continental Oil Co. at Ponca City. In the foreground are the piers for the exchanger while the foundations for the coke drums, fractionator and furnace are in the background. The shell plates for the drums are on the ground just to the left of center of the picture. When completed, the unit will produce 3,250 bbl. of gasoline, 7,000 bbl. of clean gas oil and 413 tons of coke per day.

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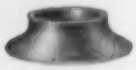

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The naphtha unit will produce close-cut specialty naphthas for use as solvents by the varnish, rubber, and allied industries.

The units are scheduled for completion September 1.

Refinery Dividend Slump Due to Shifting of Dates

WASHINGTON.—Publicly announced dividend payments by refining corporations in March were slightly below those of the same month last year but the drop was not indicative of any loss in earnings.

The monthly report of the Commerce Department placed the payments at $235,600,000, compared with $236,800,000 in March 1953, but explained the decline was due to the shifting of dividend dates by some companies which last year made disbursements in March.

The shfiting of dividend dates appears to be spreading in the manufacturing industries. Not only oil but the nonferrous metals and machinery groups are altering their dividend dates, the department said.

Petrochemicals

Canadian Petroleum Chemists Will Meet

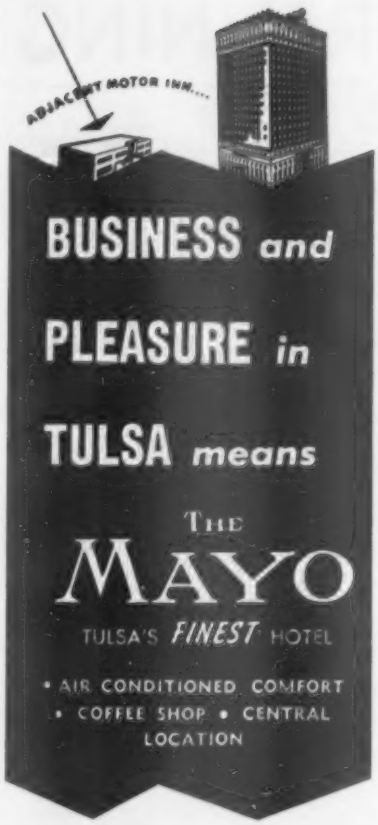
TORONTO. — Unit operations in petroleum chemistry will receive particular attention as the Chemical Institute of Canada holds its thirty-seventh annual conference and exhibition at the Royal York Hotel here, June 21-23.

A symposium of the chemical engineer in Canada will share the program together with a discussion on packed towers for distillation, gas absorption, and extraction by Max Leva, U.S. consultant.

Barton Plant on Stream

NEW ORLEANS.—The new Barton plant of Lion Oil Co. near here is scheduled to go into full operation next month. The plant on May 17 shipped its first trainload of anhydrous ammonia.

Current anhydrous ammonia output is up to design capacity of about 300 tons per day. Shipments of pelleted ammonium nitrate are expected to bring this production total to 600 tons a day, not including 42 tons daily of dry ice and liquid carbon dioxide and 430 tons of nitric acid.



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Valve installation on big-inch crude line

THESE valves were installed on the 24-in., 455-mile Rancho Pipe Line System. Note that the stub valve has insulating washers in place and that the main-line valve is of the weld-end variety—trends in modern construction.

The Rancho system extends from McCamey in West Texas to the Houston area and was constructed as a joint venture by seven companies. The companies are Shell Pipe Line Corp., Ashland Pipe Line Co., Crown-Rancho Pipe Line Corp., Nantucket Pipe Line Co., Pan American Pipe Line Co., Phillips Pipe Line Co., and Sinclair Pipe Line Co.

Under Way, Contracted, and Planned . . .

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

• **Atlantic Pipe Line Co.**—Planning 40-mile, 8-in., looping of present crude line from Andrews to Midland, Tex.

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **Cities Service Pipe Line Co.**—60 miles, 12-in., Sour Lake, Tex., to Houston, Tex. O. R. Burden Const. Co. Completion set for June 1954.

• **Magnolia Pipe Line Co.**—208-mile, 20-in. crude line under way from Corsicana to Magnolia's refinery at Beaumont, Tex. H. B. Zachry, Const.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. Cost: $3,500,000.

• **Orchard Pipe Line Co.**—45-miles, 8-in., proposed to transport crude from Masters field in Logan County, Colorado, to point 4 miles northwest of Orchard. Estimated cost $811,250.

• **Pawnee Pipe Line Co.**—35 miles of 10, 8, and 6-in. line approved from Adena field in Colorado to Merino, Colo.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

• **Sinclair Pipe Line Co.**—20 miles, 12-16 in., planned, Monee to Blue Island, Ill. 16-in. completed. 14 miles of 12-in. awarded to Morrison Const. Co. Est. completion July.

• **Sioux Pipe Line System.**—Under study by Shell Pipe Line Corp. for group of 12 Williston basin producers. Length of line, pipe size, and terminal point pending final report by Shell.

Trans Mountain Oil Pipe Line Co.—Com-

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pany has awarded contract to Engineers Limited Pipeline Co. to build 15 miles of 20-in. and 11 miles of 16-in. line. Both lines run from Sumas, B. C., to General Petroleum's refinery which is being built at Ferndale, Wash.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. Size not yet determined. Engineering work under way.

• **West Coast Pipeline Co.**—960 miles, 24-26-in., planned. Wink, Tex., to Norwalk, Calif. $106,000,000.

Products Pipelines

American Pipe Line Co.—Line planned from Gulf Coast area to New York City area.

Badger Pipe Line Co.—215 miles, 8-10-12-in., begin Spring '54, East Chicago, Ind., to Madison, Wis. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas Co.)

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

• **Frontier Ref. Co.**—215 miles, 6-in., planned, Cheyenne, Wyo., to North Platte, Neb.

Great Lakes Pipe Line Co.—Under way extension 130 miles, 8-in., Nebraska City to Grand Island, Neb. R. H. Fulton Const. Co.

• 150-miles, 8-in. to run from Iowa City, Iowa to Prophetstown, Ill., and to tie in to the Badger system there.

• 189 miles of 12-in. to run from Kansas City to Des Moines.

• 98 miles of 12-in. from Rosemount to Willmar, Minn.

• 63 miles of 12-in. from Willmar to Alexandria, Minn.

• 105 miles of 8-in. from Alexandria to Fargo, N. D.

Harbor Products System.—86 miles of 16-in. underway from Woodbury Junction to Tremley Point, N. J. Pipeline Construction & Drilling Co. is doing the work and completion is not definite because of right-of-way difficulties.

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn.

• **Oil Basin Pipeline Co.**—230-mile, 8-in. products line planned from Laurel, Mont., through Billings to Glendive, Mont. Construction tentatively set to start as soon as weather permits with completion set for late summer. Est. cost: $5,350,000.

Oklahoma Mississippi River Products Line, Inc.—475 miles, 10 and 12-in., under way, Duncan, Okla., to West Memphis, Ark. Ford, Bacon & Davis Const. Corp.

Under way, White River to Allen, Okla. River Const. Co. Completion date 6-30-54.

Under way, Allen to Duncan, Okla. River Constr. Corp. Completed.

Phillips Pipe Line Co.—71 miles of 8-in. now out for bids. Company expects line to be completed in September.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt.

• **Triangle Pipe Line Co.**—560 miles, proposed, Arkansas City, Ark., to Covington, Ky., and Nashville, Tenn.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles. 8-in., under way. Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 531 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. 9-54. Est. cost: $20,500,000.

Billings to Bozeman, Mont. Ross and Powers. Comp. 133 miles, 8-31-54.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc. Completed. 94 miles 6-15-54.

Clinton to Perma, Mont. Associated Pipe Line Contractors, Inc. 69 miles 8-31-54.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co. 76 miles. Completed.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co. 74 miles 7-1-54.

Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co. 85 miles 7-1-54.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

• **Arkansas Louisiana Gas Co.**—108 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166.

• **Atlantic Seaboard and Virginia Gas Transmission.**—116 miles, 26-in., proposed, loops along Cobb, W. Va., to near Baltimore, Md. Start May 1.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **Cities Service Gas Co.**—24 miles of 26-in. proposed, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas.

Nine miles of 20-in. to replace existing 16-in. line in Cherokee and Jasper counties, Missouri.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., FPC approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

City of Dallas, Ga.—56 miles of 8 and 4½-in., distribution system. Engineering & Const. Co. Completion June 1954.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

49 miles, 20-in., under way, Morton County, Kansas, to near Hooker, Okla. Estimated cost: $3,999,000. R. H. Fulton Const. Co.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Dixie Pipe Line Co.**—Proposed 20-mile, 8-in., line from Gwinville field to connection with Transcontinental Gas Pipe Line Corp.'s existing transmission line in Jefferson Davis County, Mississippi. Est. cost: $425,000.

• **El Paso Natural Gas Co.**—20 miles of 10¾-in. proposed from Warren Petroleum Corp.'s Saunders plant in Lea County, New Mexico, to connection with El Paso's existing 30-in. line in Lea County.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Houston Contracting Co., Ltd., has completed 370 miles of its 500-mile contract from Rayne, La., to Kinkade, Tenn. Three spreads which have been working on the job are presently overhauling equipment and will not resume work until spring. Spread 1, headed by E. C. Norris, has completed 165 miles from the Mississippi River northward and it will resume work this spring.

Spread 2, headed by F. A. Silar, has completed 117 miles from the Ouachita River southward into the inception point of Rayne.

Spread 3, headed by M. L. Thompson, has completed 88 miles from the Ouachita River northward to the Mississippi River. It will begin work in the spring at the terminus of Kinkade, going south to join with Spread 1.

The remaining 360 miles is under contract to H. C. Price Co., Bartlesville, Okla. The firm has completed 279 miles and has 81 miles remaining which will be started in the spring. Five spreads, headed by G. A. Reutzel, R. L. Ezell, C. E. Shivel, and W. H. Olrich, have done the work. Price's contract covered the line between Gordonsburg, Tenn., and Catlettsburg, Ky.

Under way, Rayne, La., to Kincade, Tenn. Houston Contr. 370 miles laid. 130 miles left to be finished Spring of 1954.

Under way, Gordonsburg, Tenn., to Catlettsburg, Ky. 266 miles completed, 91 miles left.

230 miles, gathering lines, under way. Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—Asking for bids on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Also asking for bids on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County Line, W. Va. Est. Cost: $930,000.

Iroquois Gas Corp. and Tennessee Gas Transmission Co.—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

Kansas-Nebraska Natural Gas Co., Inc.—Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

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• **Lateral Gas Pipe Line Co.**—27 miles, 4½ in., proposed, from Grant to Clarinda, Ia. Estimated cost: $267,200.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

Missouri Central Gas Co.—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co. and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Midwestern Constructors, Inc., has two jobs for company. No. 1 is 94 miles of 30-in. pipeline consisting of five loops (one in Texas, one in Oklahoma, and three in Kansas). 20 per cent completed as of May 20. No. 2 is 95 miles of 30-in. pipeline consisting of six loops (one in Kansas, one in Nebraska, three in Iowa, and one in Minnesota). 5 per cent completed as of May 20.

93½ miles of 20-in. from Ogden to Waterloo, Iowa; work being done by the Hallmac Construction Co. of Houston.

90 miles of 16-in. from Waterloo to Dubuque, Iowa; work being done by Engineering Construction Co. of Tulsa.

16 and 10-in. branch from Newton to Grinnel, Iowa; work being done by G. G. Griffis Construction Co. of Tulsa.

24 and 26-in. lines south of Paullina, Iowa, and 20 and 24-in. lines from Paullina to Sioux Falls, Iowa; work being done by R. H. Fulton of Lubbock.

Two underwater crossings totaling 5,100 ft. being done by Lone Star Constructors of Dallas.

• 167 miles of 24-in. line proposed to run from Farmington, Minn., to Duluth. Est. cost: $12,195,300.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

Northwest Natural Gas Co.—665 miles of unannounced size pipe to bring gas from Alberta, Canada, to the "Inland Empire" of

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northern Idaho and eastern Washington. Estimated cost: $36,000,000.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• 24½ miles of 20-in. line in Richland and Crawford counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in., planned, paralleling Topock-Milpitas line. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

13 miles, 16-in., scheduled for completion in 1954. From Fairfield to Napa Wye, Calif. M.G.M. Construction Co.

30 miles, 10-in., scheduled for completion in 1954. From Corning field to Chico, Calif. Company forces.

19 miles, 16-in., from Wild Goose field to Yuba City, Calif. Scheduled for 1954 completion by company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. Cost: $9,000,000.

• **Southeast Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co. Start summer 1954.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., planned, Kinder, La., to Portland, Tenn.

63 miles, 26-in., planned, loops in Ohio and Pennsylvania.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U.S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Penn-Jersey Transmission** Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755,000.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana. Work to be done in September and October.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. Cost: $1,000,000.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **United Fuel Gas Co.**—52 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

57 miles, 30-in., under way, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Kentucky. Spring '54. C. R. Ice, spreadman.

Utah Natural Gas Co.—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Pipe Line Co.—25 miles of 3-20-in. being laid in Garvin County, Oklahoma, by George W. Davis Co. Completion date not set.

Westcoast Transmission Co., Ltd.—(See foreign natural gas pipe lines).

Foreign Crude-Oil Pipelines

• **Arabian American Oil Co.**—18 miles, 22-20-in., planned, Qatif to Ras Tanura No. 3. Completion date 1-55.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work.

Creole Petroleum Corp.—21 miles, 34-in. crude line to run from Lagunillas field to La Salina, Venezuela. Williams Brothers Overseas Co. has contract with construction slated to start in February and to be completed in 6 months. Line when completed will be the world's largest-diameter crude line.

Direccion General de Yacimientos Petrolliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Estrada De Ferro Santos A Jundiai Oleoduto Santos—Sao Paulo.—This Brazilian company has completed or recently started the following lines:

2 miles, 24-in. crude line from Junction to Refinery at Capuava. Completion, May 1954.

21 miles, 12-in., planned from Cubatao to Capuava refinery. Completion scheduled for June 1954.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

• **Mid-Saskatchewan Pipelines, Ltd.**—Proposed line from Smiley Viking oil field to connect with Interprovincial Pipe Line Co.'s Kerrobert pump station.

• **Pembina Pipe Line Co., Ltd.**—Company has permit to build 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans Mountain Pipe Line Co. and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Ishthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—175 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co.—60 miles, 4-6-in., under way. Pta. Nino de La Dorada.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles, 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

• **Empresa Nacional del Petroleo**—80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

OIL MEANS INDUSTRIAL DEVELOPMENT

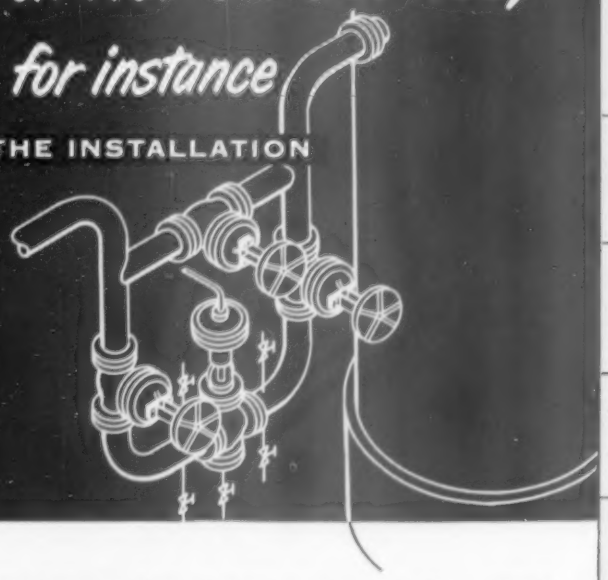
New manufacturing processes . . . new products . . . have come from the development of new uses for oil and its by-products. In the daily job of finding additional oil resources, the Schlumberger Electrical Log . . . the pioneer well logging service . . . has long been recognized as the most important single subsurface exploration method available to the industry.

. . . and Schlumberger means Service

Schlumberger Well Surveying Corp. • Houston, Texas

You Can Measure this Valve's Quality on Hot Oil Service, for instance

THE INSTALLATION



In a leading lube oil plant on the Gulf Coast, using Crane Steel Valves on hot oil extraction lines from tower in Duo-Sol unit. Working pressure 100 psi at 850 degrees F.

VALVE SERVICE RATINGS

SUITABILITY:	Couldn't be better
FEATURES:	Exelloy trim
MAINTENANCE COST:	Routine service only
SERVICE LIFE:	No efficiency loss since 1951
OPERATING RESULTS:	Safe, dependable control
AVAILABILITY:	Catalog item — No. 47X

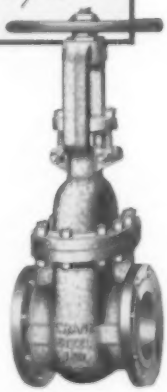
THE CASE HISTORY

Valves formerly used here were identical in design and appearance with their Crane replacements. But the similarity ended there. For they gave continual trouble in this round-the-clock process. Sticking discs made them extremely difficult to operate. They failed to hold tight on closure. Their replacement became mandatory for efficient operation.

It's been a different story since Crane 47X steel gates were installed almost 2 years ago. No more sticking of discs . . . no leakage anywhere . . . and with only routine maintenance.

THE VALVE

Work horse of the petroleum industry—Crane 150-pound steel gates—with exceptional performance assured by Crane quality design . . . Crane metallurgy . . . and the high adaptability of Crane Exelloy trim for oil and oil vapor services. Sizes 2 to 24 in.; screwed, flanged, welding ends. See your Crane Catalog or Crane Representative.



THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES · FITTINGS · PIPE · PLUMBING · HEATING

Save Time

. . . Use These Handy Time-Saver Cards

Want more information on products advertised in this issue? Or do you want to know more about the items described in the "New Equipment Section"? Or would you like some of the literature here mentioned?

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Just use the convenient pre-stamped cards on this page. We'll forward your requests promptly.

To The Oil and Gas Journal: Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of May 31, 1954

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Mark here FOR MORE INFORMATION ON ADVERTISED PRODUCTS

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The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.

We do the rest

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. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller

Fuel Tank Carried by Two Men

Collapsible fuel tanks so light they can be carried by two men are being tested for use in speeding up super highway construction. The tanks, with capacities ranging from 900 to 10,000 gal. of gasoline, provide mobile tank farms to move forward with construction equipment.

Coated with petroleum-resistant synthetic rubber, the pillow-shaped tanks are serviceable in all kinds of weather. Standard Oil Co. of Ohio, which placed installations at Goodyear's test grounds recently, transported gasoline to the portable tanks and had them pumping in 45 minutes.

The lightweight tanks were developed for military use, but are now being adopted in oil fields and construction jobs. *Goodyear Tire & Rubber Co.*

Check No. 1 On The Time Saver Card

●

New Pressing System Does Away With Hand Splicing

Savings in time are made possible by a new wire rope pressing system that eliminates hand splicing. Using the new system, a worker can make as many as 20 or 30 splices in an hour, as compared to 6 or 7 conventional splices per hour for a skilled worker using hand methods.

The new pressing system employs an aluminum alloy clamp or sleeve that is squeezed around the wire rope in a special 300-ton hydraulic press. Called JalKlamp, the device is used as a mechanical method of splicing eyes, with or without thimbles, in the ends of wire rope. This splice gives 100 per cent of the breaking strength of the wire rope itself.

The clamp or sleeve in the new system consists of a piece of metal tubing that looks like a heavy bracelet, oval in cross section, with a place for the two ends of the wire rope cable to be clamped together. The sleeve material is a special noncorrosive aluminum alloy that combines great strength with the ability of cold flowing under pressure. A pressed joint is formed without damage to the individual wires. The clamp metal actually flows into the space between the wires in the strands and between the strands themselves. The clamp becomes a part of the rope.

Jones & Laughlin is leasing special 300-ton capacity motor-operated hydraulic presses to apply this type of terminal to wire up to and including ¾-in. diameter. With this unique press, any type of wire rope with any type of center, including fiber, can be squeezed with 100 per cent efficiency. A complete set of dies for different rope diameters goes with each press. *Jones & Laughlin Steel Corp.*

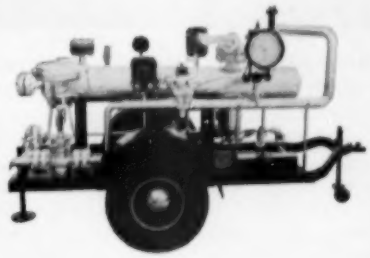
Check No. 2 On The Time Saver Card

●

Wellchecker Records Oil, Gas, and Water Produced

A new Wellchecker to automatically record the amount of oil, gas, and water produced at operating pressures of 1,800 psi. has been added to the standard line of Wellcheckers.

The unit, known as No. 18H-1207, is 12¾-in. in diameter, 7 ft. seam to seam, and equipped with 1-in. oil line and 3-in. gas run. Oil and gas may be removed separately or recombined after



being metered. Unit is mounted on a balanced Level-load trailer. It may be easily pulled behind passenger car or truck. Capacity is 400 bbl. per day —8,000 M.c.f.d. Same model for higher capacities will also be manufactured. Units are A.P.I.-A.S.M.E. code labeled. *Rolo Manufacturing Co.*

Check No. 3 On The Time Saver Card

●

Shut-Downs Eliminated By Hollow Sucker Rods

A new hollow sucker rod to be known as Falconrod makes possible the economical treating of wells having problems with paraffin, asphaltic deposition, corrosion, and emulsion, without the necessity of shutting down the well. Low gravity, high pour-point crude oils

may also be treated by means of this rod. By injecting hot oil, steam, chemicals, solvents, corrosion inhibitors, or volatile treating compounds through the hollow rods and into the well, the expense of a costly stripping job plus the loss of production can be saved. The treaters are introduced below the trouble zone for better penetration, while the well is pumping. Multiple zone completions are also simplified by using hollow rods.

Falconrod has also proved successful in flowing wells to introduce heat to the producing formation and to provide circulation for removing sand plugs and to free stuck packers and liners. Wax and asphalt can be kept in solution resulting in cleaner flow

lines, cleaner traps and gathering lines, lighter well torques, and lower maintenance costs.

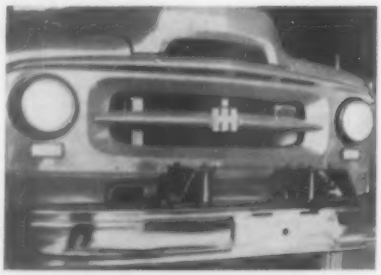
Falconrod is made of A.I.S.I. 4140 fully heat-treated chrome-moly alloy steel sucker rod pins, flash-welded to 1⅛-in. o.d. (.250-in. wall) A.I.S.I. 1035 (or comparable analysis) seamless cold-drawn and finish-annealed steel tubing. Welds are 100 per cent inspected, Magnafluxed, and normalized to prevent any chance for failure. The shoulder type pins have ⅞-in. A.P.I. thread specifications and are interchangeable with all other A.P.I. connections. Falconrod is supplied in 25 and 30-ft. lengths to meet standard operating practices. *Falcon Products, Inc.*

Check No. 4 On The Time Saver Card

●

Front-End Winch Carries Practically Full Load

A new front-end winch, Model MU7-16F, is available as winch only or with a drive kit that is very easy to install. When mounted, the winch does not take away the tailored look from the front of the truck. Several Braden MU7-16F winches are now in service



with geophysical servicing units operating throughout the world.

In designing the winch, engineers kept in mind the desirability of a winch line speed of approximately 20 ft. per minute, allowing the winch to carry practically all the load of the truck, not allowing the truck to take the pull with the winch merely assisting.

Incorporated in this new unit is a manual control for the operator's convenience in free spooling the cable drum when such an occasion arises. This winch has the automatic safety brake for better safety in case of winch drive failure. Added to the safety brake are cooling fins for aiding in dissipating the heat from the brake and housing when the winch is used under extreme conditions. Model MU7-16F is equipped with a gear ratio of 32:1 and is rated at 15,000 lb. on the first layer of cable on the bare drum. *Braden Winch Co.*

Check No. 5 On The Time Saver Card

●

Tire-Track Gives Traction, Flotation to Tire Vehicles

The Galanot Tire-Track, a traction and flotation device comparable to a crawler mount, provides a maximum of flotation and tractive effort under the most extreme conditions for almost all types of rubber-tired vehicles. Tire-Track is designed to fit a range of tire sizes from 6:00-15 to 18:00-26.

Built with variable shoe lengths and with versatile chain arrangements, the Tire-Tracks can be applied to dual or single tires on either single or tandem axles. With a connector plate lacing varying from 1 by 2 to 6 by 6 and in special cases even higher, the equipment can handle the lightest loads to gross loads as much as 60,000 lb.

Galanot Tire-Tracks have already been applied with success on large oil rigs, mobile cranes, trucks, mobile shovels, and Payloaders. They have found wide usage in such major fields as exploration, seismographical surveying, oil-field production, construction, and steel erection. *The Union Chain & Manufacturing Co.*

Check No. 6 On The Time Saver Card

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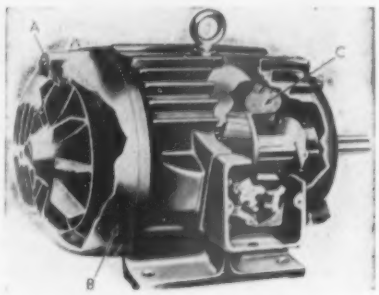


New Range of Motors for Corrosive Applications

A new range of squirrel-cage induction motors is specially designed for operation in the corrosive but non-explosive atmospheres. The motors are made to standard dimensions and are available in outputs up to 25 hp. These motors incorporate features that resist the corrosion caused by such things as excessive humidity, salt air, and sulfur dioxide fumes.

A molded plastic fan, "A," mounted on the nondriving end of the shaft, cools the motor by blowing air along axial cooling fins cast integral with the motor frame. The fan is made from phenol formaldehyde. Durability and fatigue tests have been carried out to prove the suitability of this material. After tens of thousands of stress reversals, simulating the severest conditions of duty that could be imposed on a motor, the fans have remained undamaged and secure.

Polyvinyl-acetal-covered wire is used for the stator winding—"C." The windings are impregnated with phenolic insulating varnish by dipping and baking them four times in an automatic heat-controlled continuous even. Wherever possible, cast iron is used for components forming the external surfaces of the motors. The cowl "B" over the fan

may cut costly hours

HALLIBURTON

DUMP BAILER SERVICE

THE FIRST AID FOR MANY REMEDIAL JOBS

Prompt first aid for remedial work may cut costly hours—and a real reduction in down-time means important savings. That's one big reason why the Halliburton Dump Bailer Service—*the fast, efficient answer to many remedial problems*—has been a consistent favorite of operators everywhere.

Here are some of the jobs that proved the performance and speed of Dump Bailer Service—placing a quick-setting concrete to cover the top of shots; eliminating excess hole by plugging back the bottom; removing securaloy pipe in the string *in eight hours*, a speedy replacement for the old drilling out method.

In combination with the drillable DB Bridging Basket, the Halliburton Dump Bailer Service provides a perfect combination for building plugs in open hole or casing to isolate formation, acidize, locate and repair casing leaks, perforate, cement liners, plug back to abandon and other remedial jobs.

The simple operation of the Bridging Basket helps to explain the fast action. Just a slight pickup on the string of bailers sets and opens the umbrella-shaped basket, and then dumps the plugging material. This synchronized action *eliminates one round trip* for both temporary and permanent plug building.

Next time you have a remedial job that involves plugging or bridging, figure how much your down-time will cost. Then get the facts on both the time-saving and performance advantages of Halliburton's Dump Bailer Service. You'll prove that the substantial cut in down-time will mean an important reduction in cost. Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

is also made of cast iron instead of pressed-steel, and all external surfaces of the stator and the fan cowl are finished with a special protective paint. *English Electric Co.*

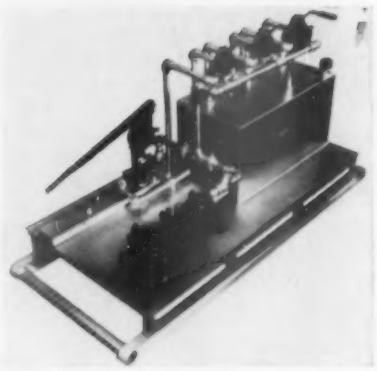
Check No. 7 On The Time Saver Card

●

Closing Unit Uses Diesel Fuel and Kerosine

This new closing unit uses a mixture of diesel fuel and kerosine, instead of drilling mud, to operate the hydraulic rams of the blowout preventer. This eliminates the sanding-up of the rams, cylinders, and lines. The entire unit is skid-mounted and has a 50-gal. tank for storage of hydraulic fluid.

All moving parts are standard equipment in the oil industry. The Gardner-Denver pump is operated by steam, air, or gas. A few strokes on the Baker hand pump brings the pressure on the rams up to 6,000 psi. The manifold is equipped with Barksdale four-way valves and the pump is protected by an Edward check valve. The unitn sets on the rig floor within easy reach of the driller. Under normal operating conditions, it will furnish fluid under pressure to close rams in less than 1 minute. *B. M. Davis Tool & Machine Co.*



Check No. 8 On The Time Saver Card

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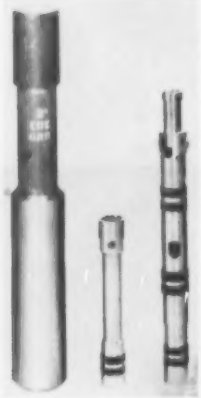
New Tool Allows Flexible Dual Completion Control



The Vari-Flow is designed as a completion and production tool for dually completed wells. It will permit the operator, at his option, to produce the well as a standard dual completion or with the flow courses crossed over by interchanging two flow sleeves, under pressure if desired, with an ordinary set of wire-line tools.

The equipment consists of three basic pieces: The nipple assembly, attached immediately above the upper packer and run into the well with the tubing string; the straight-through sleeve, a retrievable tool run and pulled with wire-line tools; and the crossover sleeve, a retrievable tool run and pulled with wire-line tools.

When the straight-through sleeve is landed in the nipple of the Vari-Flow head, the flow courses are as in a regular dual completion, i.e., the upper horizon is produced through the tubing-casing annulus, the lower horizon is produced through the tubing.

As the crossover tool is landed in the nipple of the Vari-Flow head, the fluid courses become crossed over, i.e. the upper horizon is produced through the tubing, the lower horizon is pro-

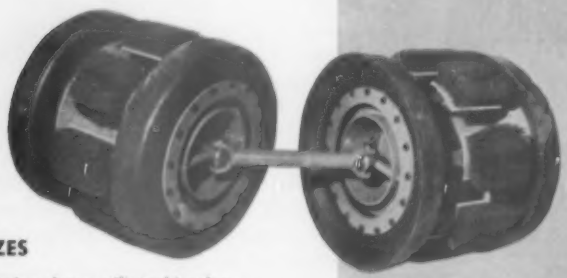
Pat. 1,234,567
Other Pat. Pend.

WEAR COMPENSATING PIGS

Sizes 6" to 34"

. . . with years of proof that the rugged, simple design means SAFE OPERATION . . . even through pipe lines with sharp bends*

TYPE GP-3

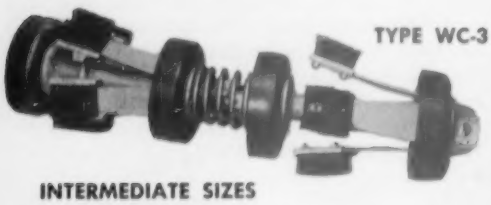


BIG-INCH SIZES

Improved "GP" design: large, stiff steel brushes each expanded by 200-lb. arched spring.

*These 2 jointed Pigs traverse welding ells. Other models traverse all pipe-line gate valves.

TYPE WC-3



"There is a Pig design for your pipe-line problem."

INTERMEDIATE SIZES

"Spring-board" steel arms expand brushes or chevron blades . . . will even clean 2 sizes of pipe when Pig equipped with special cups or discs.

Copyright 1953

T.D. Williamson, Inc.

THE PIG WITH THE POKE
CLEANS PIPE LINES

P. O. BOX 4038
TULSA 9, OKLAHOMA

REPRESENTATIVES . . . HOUSTON • PITTSBURGH • KENILWORTH, N. J. • AMARILLO CASPER • PROVO, UTAH • LOS ANGELES • OAKLAND • EDMONTON • CALGARY TORONTO • BUENOS AIRES • DURBAN, NATAL, SOUTH AFRICA

What's New... Use the handy Time-Saver Cards

duced the tubing-casing annulus. *Pressure Services, Inc.*

Check No. 9 On The Time Saver Card

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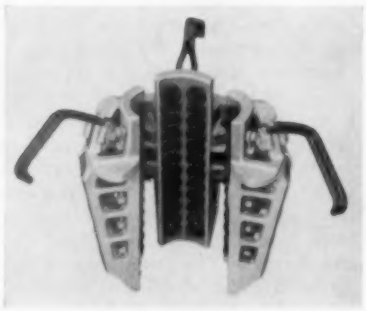

Lightweight Drill-Pipe Slips Are for Heavy Work

New all steel drill-pipe slips are ruggedly strong for heavy duty service, yet are light in weight. For example, slips for 4½-in. drill pipe, complete with buttons, weigh 145 lb. This light weight, in combination with short handles, makes them easy and fast to operate.

The interlocking buttons rock slightly, both vertically and horizontally, to take a quick, nonslip grip which avoids any continuous straight marking on the pipe and assists the slip segments to set uniformly. The buttress-type teeth on the buttons make it possible to secure greater hardness, longer life, and less breakage.

Converting type buttons are available to permit reducing the size of the slips without having to purchase an additional slip body. *Web Wilson Oil Tools, Inc.*

Check No. 10 On The Time Saver Card

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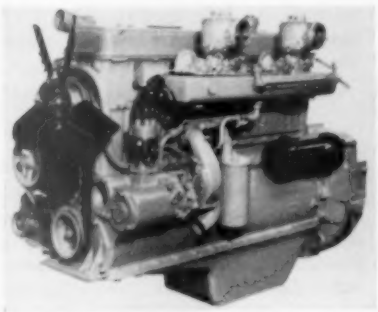

Power Unit Offers Low Power-Weight Ratio

This new Model 590 develops more than 200 hp. yet weighs less than 1,300 lb., for what is said to be the lowest power-weight ratio of any heavy-duty truck engine. As the new engine also has a length less than 50 in., it will be applicable for many replacements as well as original equipment.

The new engines will be available for gasoline or liquid petroleum gas fuels. Customers have the option of dual down-draft carburetors for maximum power output or single up-draft carburetion for maximum economy.

The head design with overhead camshaft and rockerarms actuating overhead valves permits placing valves on both sides of the center line of the head so that larger valves with ample water jacketing can be used.

These engines feature unit assembly of crankcase, cylinder block, and head which permits quick replacement of the block and pistons without removing the crankcase from the vehicle. Long studs in the crankcase pass completely through the cylinder block and head, holding the engine rigid but permitting rapid disassembly and ready replacement of single units. *Hall-Scott Division, ACF-Brill Motors Co.*

Check No. 11 On The Time Saver Card

●

Lightweight Centrifuge Offers Longer Gear Life

A new lightweight centrifuge features worm-gear drive and bearing-supported shafts. The worm-gear drive makes for easier turning and longer gear life. This construction, with fewer teeth in both gears, permits each tooth to be made larger and deeper to prevent slippage.

The drive gear, with the worm cut on the steel spindle shaft, is made of best gear bronze, precision machined to insure maximum wearing qualities and silent operation. Both crank and spindle shafts are supported by two bearings each to insure proper alignment. All bearings are self-lubricated and require no maintenance.

This centrifuge is designed to separate samples containing liquids of differing weights. The gear ratio permits convenient operation within the speeds prescribed by A.S.T.M. and A.P.I.

Castings of high-strength aluminum alloy reduce over-all weight of centrifuge considerably from old-style models. *Protek Specialty Co.*

Check No. 12 On The Time Saver Card

●

Scout Ditcher Can be Installed in 10 Minutes

The Scout is easily installed or removed. Little more than 10 minutes is required for the actual installation. The ditcher operates in a 160° arc behind the tractor and the bucket reaches 14 ft. behind the main "A" frame. The bucket height goes up to 10 ft. The dumping clearance with hydraulically operated bucket is 8 ft., enabling the ditcher to load into dump trucks. The maximum digging depth with the hydraulically operated bucket is 12 ft.

A new design makes available tremendous pressure in loading and hastens the dumping action. The design is such that the loading of the bucket is done with a push stroke of the hydraulic cylinder in such a manner that a direct pull is applied on the bucket.

The new Scout covers a wide range of digging jobs. It is ideal for jobs too big and too heavy for manual labor and for jobs where heavier equipment is cumbersome and awkward to operate. *Shawnee Manufacturing Co.*

Check No. 13 On The Time Saver Card

They're NEW

- **Bulletins**
- **Catalogs**
- **Brochures**

for your copy, check ✓ ✓ the Time-Saver Cards.

Acidizing at High Temperatures With Dowell Inhibitor. This Data Sheet No. 3 reviews an actual problem involving acidizing at high temperatures, covering method of acidizing, the condition of the well, and the results obtained by this method, minimizing corrosion during the acidizing. *Dowell Incorporated.*

Check No. 14 On The Time Saver Card

●

Chronoflo Level and Pressure Telemeter, Bulletin 230-K10, describes the application of Chronoflo telemetering to level control in reservoir, and elevated and ground storage; to pressure control in pump discharge lines; distribution systems, booster stations, industrial processes, steam and gas lines; and to automatic pump control. This eight-page bulletin includes features, descriptions, and illustrations of the transmitters and receivers, and diagrams of installation arrangements, together with explanatory material on application and operating features. *Builders-Providence, Inc.*

Check No. 15 On The Time Saver Card

●

Lubrication Equipment for the Servicing of Lubricated Valves. Citing the experience of industry that 80 per cent of all service problems in lubricated valves are due to faulty lubrication, the catalog points out that thorough lubrication at regular intervals maintains positive seal, keeps valves free-operating against high pressures, and protects working surfaces against wear and corrosion. Various types of lubrication fittings, which are inserted in the same threads in place of existing lubricant screws on lubricated valves; special extra heavy duty lubrication guns, both lever and bucket types; hose assemblies; follower plates; pressure gages, and other accessories are covered in the catalog. *Alemite Division, Stewart-Warner Corp.*

Check No. 16 On The Time Saver Card

●

Heated and Cooled Gages and Valves. A new four-page Data Unit No. 237 covers special purpose heated and cooled gages and valves which solve the problem of getting accurate level readings of liquids that boil or surge, or of liquids that are heavy and don't flow at normal temperature. Special design and construction features are described and illustrated. *Jerguson Gage & Valve Co.*

Check No. 17 On The Time Saver Card

●

Type YR Mechanical Drive Turbine. The 16-page Bulletin H-22 gives emphasis by large, detailed illustration to design features and proper control of mechanical drive turbines. Modifications, specifications, and dimensions are detailed. *Elliott Co.*

Check No. 18 On The Time Saver Card

●

Heat Exchanger Division. Rigid standards have been set up for heat transfer equipment, demanding uninterrupted service in operating economy. This booklet is intended to acquaint petroleum refining, power generation, and chemical processing industries with the work that has been done by the company in designing, engineering, and fabricating to meet these standards. The company manufactures condensers, heaters, evaporators, coolers, heat ex-

you don't drill for oil with a Garden Hoe! but what about your mapping procedures?

When it comes to mapping and surveying, the modern way is the Jack Ammann Photogrammetric way, as so many leading oil and pipeline concerns have already discovered.

No terrain is too rugged, no area too remote for the airborne crews of Jack Ammann Photogrammetric Engineers. No matter whether your problem involves oil exploration, pipeline location or some other phase of work, in this country, or abroad—it'll pay you to consider the many advantages of Ammann aerial surveying and mapping. Cost-savings often range up to 50% or more when compared with the expense of conventional ground surveying methods, while time-savings are even more pleasing percentagewise. Call or write our nearest office to discuss your mapping problem which will be treated with the utmost confidence.

READY NOW! Regional Maps, Air Photographs and mosaics of approximately one million square miles of the Rocky Mountain Area.

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changers, generators, and steam jet refrigeration equipment. The booklet carries the reader through the manufacture of this type of equipment, with complete illustrations and photographs. *Lummus Co.*

Check No. 19 On The Time Saver Card

●

International Trail. Two petroleum industry extremes, pipeline stringing and product delivery, are the subjects of special feature articles in the May 1954 issue of International Trail magazine. Subjects of the stories are the operations of J. O. Willett, Monroe, La., whose crews string pipe in the South, Middle West, and East, and Miller Petroleum Transporters, Ltd., Jackson, Miss. *International Harvester Co.*

Check No. 20 On The Time Saver Card

●

New Valve Comparison Chart lists valve figure numbers of 15 major manufacturers and the O.I.C. equivalent valve figure numbers. The chart compares gate, globe, check, and angle valves in bronze, iron, cast steel and forged steel. Only gate valves are presented in stainless steel. Lubricated plug valve comparisons include those made of cast steel and cast iron. In handy booklet form, the chart listing is broken down to include descriptions of the various valve lines. *The Ohio Injector Co.*

Check No. 21 On The Time Saver Card

●

J-M Raschig Rings. These split metal Raschig rings are made from any required metal in diameters from ¼ to 3 in. They are available in almost any size of thickness of metal in many different ratios of diameter to length for packed towers in absorption, fractionation, extraction, and other related processes. This new folder provides data for engineering firms who are designing and constructing new towers, and for engineers who specify packing for existing towers. *Johns-Manville.*

Check No. 22 On The Time Saver Card

●

Hose and Belts is a new brochure, S-5111, designed to aid the oil industry in choosing the proper type of hose and belts for specific operations. New applications of hose, which solve the cost and service problems confronting oil producer and refiner, are fully cataloged according to specific duties, special features, available sizes, and actual construction designs. The brochure includes also information on flat belting, V-belting, and sheet packing products, with special emphasis on the "job designed" Compass Steel Cable sling belt. *Goodyear Tire & Rubber Co.*

Check No. 23 On The Time Saver Card

●

Geared Motor Catalog No. CC-14A. The new catalog, covering the ACEC-SADI line of geared motors built to N.E.M.A. specifications, is a 14-page, technical brochure, including a complete price list, dimensions, operating characteristics, and photographs and diagrams prepared by the engineering design departments of Ateliers de Construction Electriques de Charleroi (ACEC) and Societe Auxiliaire d'Industrie (SADI). *Belgian Electric Sales Corp.*

Check No. 24 On The Time Saver Card

●

Klinger Master Catalog describes the complete range of Klinger products including compressed-asbestos sheet packings for all purposes, valves made for every application, cocks, level gages, and synthetic and silicone rubbers. *Richard Klinger, Ltd.*

Check No. 25 On The Time Saver Card

FOUR BIG REASONS

Why, in the Oil Industry, it pays to

Think... FIRST

❶ One of the largest Oil Credit Files in the Nation ❷ a staff of full time appraisers with over 73 Years Combined Oil Business Experience ❸ 11 Nationally known Oil Men on our board ❹ 58 years experience as one of the leading Oil Banks in the Nation . . . Let us prove it pays to —

Think... 1st *of Tulsa*

SINCE 1895

THE FIRST NATIONAL BANK AND TRUST CO.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

EQUIPMENT MEN . . . in the News

Reed Announces Key Management Changes

S. P. FARISH

Stephen P. Farish, president of Reed Roller Bit Co. since 1925, was named chairman of the board at the annual meeting of the board of directors. At the same time R. G. Hamaker, formerly vice president in charge of sales, was elevated to succeed Farish as president, and

R. G. HAMAKER

H. C. TOOLEY

H. C. Tooley, formerly vice president in charge of manufacturing, was elected executive vice president.

W. B. NOBLE

E. F. SNOW

The directors also designated W. B. Noble as first vice president in charge of engineering, and E. F. Snow as second vice president and treasurer.

Farish has been with Reed for 30 years, his service dating from 1924 when he was a partner in a small tool company later absorbed by Reed. His life in the oil business had its beginning in 1913 as a driller and tool pusher. In 1915, Farish moved to Humble, where he later became production manager. It was at Humble that Farish first encountered what was later to be known as the Reed Roller Bit, but then the Humason bit.

When Humble Oil & Refining Co. was formed in 1916, Farish was one-third owner of Globe Refining Co., one of the companies of which Humble was formed. He was manager of Humble's northern division when he resigned in 1922 to form a drilling contracting company. The company later became Navarro Oil Co., and was sold to Continental Oil Co. in 1945.

In 1925, Farish joined with the syndicate that purchased Reed Roller Bit Co. from C. E. Reed, and became president of the reorganized tool company.

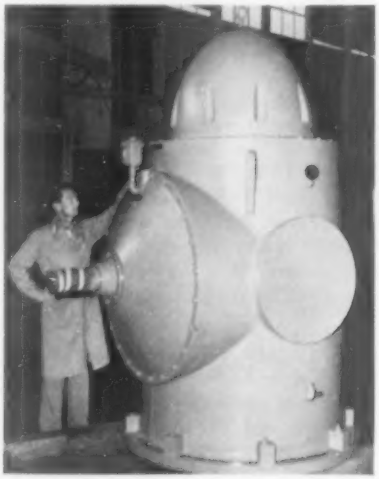
Hamaker has been with the company nearly 26 years, Tooley 17, and both Noble and Snow more than 18.

Stine Opens Fabricating, Machine Plant at Houston

Joe Stine recently opened his own complete machine and fabricating plant for the manufacture of oil-well drilling specialties and drilling rig equipment. Stine has been furnishing such equipment and service to the oil industry for 20 years, and is well known to operators in the Gulf Coast area.

Prior to opening his new shop, Stine was president and general manager of S & R Tool & Supply Co., Houston, for 8 years.

Creole Purchases Giant Gear Drive Pump Unit



One of the largest right-angle pump drive units manufactured in the West and possibly one of the biggest constructed in the nation was completed recently by Western Gear Works, Lynwood, Calif., for Peerless Pump Division of Food Machinery & Chemical Corp., Los Angeles, for ultimate use in Venezuela. The unit, known as Western Gear's Model No. 440-PI-400, is capable of driving a 610-hp. centrifugal-type pump. A Cooper-Bessemer diesel engine will drive the unit input shaft at 440 r.p.m. through 4:1 gearing to turn the pump at 1,760 r.p.m. The unit will be used by Creole Petroleum Corp., Caracas, Venezuela, for pumping water at Amuay Bay, Venezuela.

Bonus Bucks Passed on Exploration Men

At a recent meeting, in St. Louis, of American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, Herb J. Hawthorne, president Herb J. Hawthorne, Inc., Houston, distributed Doodlebugger Wildcat Bonus Bucks.

The Doodlebugger Model at extreme left depicts the many functions covered in the exploration division of the industry. Shown at the Hawthorne booth are: Bill Brooks, Engineering Supply Co., Tulsa; Bob Meisenbach and P. N. Smith, Seismic Service Supply Co., Calgary, Alberta; Mrs. Willia Garceau; Bob Garceau, Basin Oil Field Supply, Wolf Point, Mont.; Charles T. Baker, Hawthorne; Herb Hawthorne; Buck Buckley, Engineering Supply Co., Dallas; Earl M. Weaver, Hawthorne; and Max Fountain, Hawthorne.

Pacific Pumps Names Two To Los Angeles Area

W. E. Brown has been appointed to the position of Los Angeles district sales manager, and W. T. Spates has

W. E. BROWN

W. T. SPATES

been made sales engineer in the Los Angeles area, for Pacific Pumps, Inc., Huntington Park, Calif., centrifugal pump division. These appointments were announced by A. F. Canada, sales manager.

Brown has been a sales engineer with Pacific since 1951. Spates, with Pacific since 1929, has served the firm in several engineering and manufacturing capacities.

B. S. & B. Announces Sales Staff Promotions

The appointment of Ralph W. Nichols as Fort Worth district sales manager and Thomas E. Pool as Oklahoma

R. W. NICHOLS

T. E. POOL

City district sales manager for Black, Sivalls & Bryson, Inc., have been announced by Floyd C. Myers, manager, oil-field sales and service division.

Nichols was formerly B. S. & B.'s Oklahoma City district sales manager. He joined the firm in 1931, serving successively as estimator, draftsman, engineer, project engineer, contact man, and manager of Fort Worth sales office. Nichols served as sales manager of Richmond Engineering Co. from 1945 until 1950. He rejoined B. S. & B. in a sales management capacity in 1950, and in 1952 became district sales manager, Oklahoma City sales district.

"Ed" Pool was formerly B. S. & B. district sales manager, Abilene, Tex. Starting out as a serviceman at Lafayette, La., in 1938, Pool was later transferred to Salem, Ill. He was made a sub-branch manager at Carmi, Ill., shortly thereafter, and in 1947 was appointed branch manager at Odessa, Tex. In 1951 he became assistant regional manager for the West Texas area, serving in this capacity until his appointment as Abilene district sales manager in 1952.

Braithwaite Made Nalco Vice President

Dr. David G. Braithwaite, formerly assistant vice president and production manager of the Catalyst Division, National Aluminate Corp., has been named a vice president. He will continue to head production activities of the Catalyst Division in addition to assuming new management duties.

After spending several years in the company's Ion Exchange Division where he rose to associate director of research, Braithwaite moved to the Catalyst Division as production manager when full scale cracking catalyst production was resumed in 1949 at Nalco's No. 2 plant. In 1953 he directed work on the Catalyst Division's West Coast plant, which recently began operations at South Gate, Calif. He was named an assistant vice president in February 1953.

Hughes Veteran Gets 35-Year Service Pin

On completion of 35 years' service with Hughes Tool Co., Wade W. Hampton, left, manager of Gulf Coast sales, was presented with a diamond-studded service pin. Making the presentation is M. E. Montrose, vice president, sales. For many years, Hampton was associated with the company's manufacturing operations. He spent 8 years in California and was plant manager in Houston prior to his transfer to sales. For the past 9 years he has been manager of the Gulf Coast division, which includes Texas and Louisiana Gulf Coast fields.

Oilwell Makes Waters Assistant Vice President

V. J. Waters and William Miskimins have recently been promoted in the Oil Well Supply Division of U. S. Steel Corp., according to Lloyd E. Tracy, vice president. Waters, formerly manager of Oilwell's Central Midwest area, with headquarters at Dallas, has been made assistant vice president, and Miskimins, formerly manager of the North Texas and Panhandle district, Wichita Falls, Tex., was elevated to succeed Waters.

In his new duties, Waters will assist the vice president, sales, in developing

V. J. WATERS

W. MISKIMINS

and maintaining an effective customer solicitation and service program.

Waters is a veteran of over 35 years with Oilwell, starting as store manager in Cushing, Okla. After serving at various locations in Oklahoma, he transferred to the division's home office at Dallas as manager of the claim department in 1932. He became manager of drilling equipment sales in November 1946, and was appointed manager of the Central Midwest Area in 1948.

Miskimins, who is nearing 37 years' service with Oilwell, has been manager of the North Texas and Panhandle district since 1942. Prior to that time he held a similar post at Wichita, Kans., and served as store manager at numerous points throughout Texas.

Avondale Advances Carter To New Executive Post

Henry Z. Carter, general manager of Avondale Marine Ways, Inc., has been appointed executive vice president and elected to the board of directors. Carter is a member of several civic and professional organizations, and is also a member of the board of directors of American Waterways Operators, Inc., and a past member of the board of directors of New Orleans

H. Z. CARTER

Entire 8,800-Acre Field Containing 2,300 Wells Now Served By Two BS&B Waterflood Treating Plants

An Actual Case History From Our Files

Two recently completed BS&B Waterflood Treating Plants are now serving the operators* of the unitized Lake Centralia-Salem Oil Field, approximately 6½ miles long and 2½ miles wide, in southern Illinois.

PROBLEM: At the time of unitization, this field contained more than 365 tank batteries servicing approximately 2,300 wells. Most of these tank batteries were 10 years old or more, and with gas depletion and the necessity for installing gathering lines for waterflooding, a unique treating problem was presented.

SOLUTION: It was decided to consolidate the entire production through two large treating plants, each of which was to have an initial design capacity of 10,000 BOPD and 35,000 BWPD, with an ultimate capacity of 30,000 BOPD and 115,000 BWPD. Each plant was to consist of the following basic items of equipment:

1 BS&B 10′ x 28′ Freewater Knockout
2 BS&B 70LSH Steam Generators
2 BS&B 30″ x 21′ x 6″ Heat Exchangers
2 BS&B 21′-6″ x 32′-2″ 2,000 Bbl. Settling Tanks
4 BS&B 38′-7¾″ x 24′-1½″ 5,000 Bbl. Stock Tanks

Plants were to be so constructed that equipment could be added or removed without interrupting operations. Water of 1.05 specific gravity was to be removed from oil of approximately 37° API.

RESULT: Test results on these plants have been most satisfactory. Heat exchangers were transferring 2,000,000 BTU/Hr./heat exchanger under medium load with only one steam generator firing. Water carry over from the freewater knockout was less than 1%. The grind outs do not exceed .002 to .003%.

* Name supplied on request.

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division, Dept. 1-A5A

1708 West Main Street • Oklahoma City, Oklahoma

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

Chamber of Commerce. He is a law graduate from Georgetown University.

Cooper-Bessemer Creates Three New Divisions

W. R. CROOKS

The formation of three primary engineering divisions at The Cooper-Bessemer Corp. has been announced by Ralph L. Boyer, vice president and chief engineer. They will be known as development division, technical division, and product division, the activities of each division being directed by its own chief engineer.

The development division will be

R. F. LAY

T. O. KUIVINEN

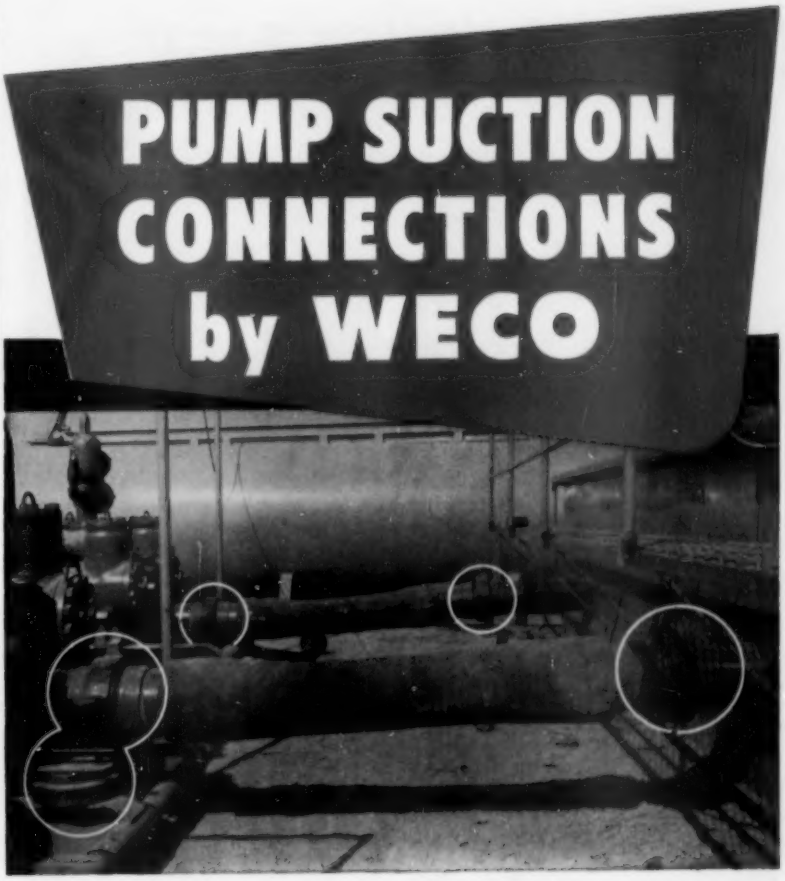
responsible solely for initiating new engine and compressor designs. The technical division will translate these new design ideas into practical machinery. Manufacture and application of Cooper-Bessemer equipment will be handled by the product division.

Promoted to position of chief engineer, development division, is W. R. Crooks, graduate in mechanical engineering from University of Missouri. In 1923, Crooks joined Fairbanks, Morse & Co., where he held various engineering positions until becoming associated with Cooper-Bessemer in 1936.

R. F. Lay, now chief engineer of the product division, joined the company in 1922. He left to work with Baldwin Locomotive Co. in 1934, and in 1940 went with Elliott Co., first as chief supercharger engineer and later as production manager. Lay returned to Cooper-Bessemer in 1946, and has had charge of stationary installation engineering until the recent change.

Chief engineer, technical division, is T. O. Kuivinen. He came to Cooper-Bessemer in 1929 where he has held various engineering positions during 25 years of continuous service with the company.

The new engineering organization plan will be headed by R. L. Boyer.



● Use of WECO Fig. 400 Unions on each end of these suction lines between mud tank and pump saves time in rigging-up and tearing down. The blanking plug, which can be quickly installed, eliminates the need for valves or line blinds when compounding the pumps.

The WECO Ball and Cone Seat assures a positive seal for the life of the union . . . you never have to worry about leaks. These 4000 p. s. i. Unions are available in sizes 6" through 10". Use Fig. 400 Unions for your pump suction connections.

PESA

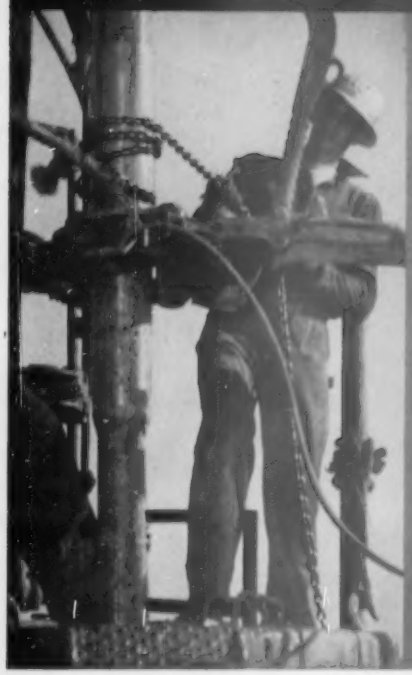
it's wise to standardize with... WECO

WECO

WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

Smart drillers specify–

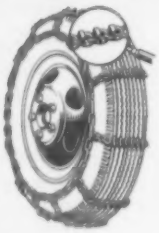
TAYLOR MADE
ALLOY STEEL
SPINNING CHAIN!

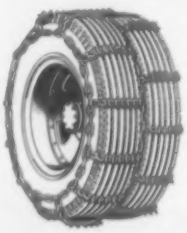


Greater strength, safety, dependability and economy than conventional Hi-Test types!

The superiority of Taylor Made Alloy Steel Spinning Chain over Hi-Test types is causing smart drillers everywhere to specify this famous new chain. Its short stubby links assure better grips. The fact that it's made from Taylor's *special analysis alloy steel* assures you of great strength, terrific resistance to cold working, grain-growth and shock at low temperatures. Hardness (Brinell 265-285) reduces wear. Complete and controlled heat-treatment removes the need of periodic annealing. Available in ¼" (9/32" actual size) and 5/16" (11/32" actual size). *Call your supply store today!*

***TM* V-BAR TIRE CHAINS**
V-Bar construction assures total traction —doubles the chain life of ordinary old-fashioned types. Available for passenger cars and trucks (single or dual wheel).





TAYLOR MADE
A GREAT NAME IN Chain SINCE 1873

S. G. TAYLOR CHAIN COMPANY
Hammond, Indiana

The programs of the three divisions will be coordinated by E. Frederick, now executive engineer.

Management Changes Made By Pacific Coast Firm

C. H. RAMSDEN

C. H. Ramsden, who has served as president since 1939, has been elected to the office of chairman of the board for Pacific Coast Engineering Co., engineers and builders of custom equipment for refinery operations. Will C. Hall, previously vice president and general manager, has been named president and general manager to succeed Ramsden. C. D. Ramsden has been named vice president and chief engineer.

Prior to joining the organization as vice president, C. H. Ramsden participated in the founding of Steel Tank & Pipe Co., Berkeley, Calif., and was associated with Western Pipe & Steel Co. as chief engineer for 9 years.

Hall has been associated with the firm since 1936, first as junior engineer, then chief estimator, and later chief engineer. Prior to joining Paceco, he was with Shell Chemical Co. and Six Companies of California.

Before joining the company, C. D. Ramsden was associated with Pittsburgh Coal Co., as assistant superintendent and plant engineer, and Copperweld Steel Co., as assistant to the consulting engineer.

Relco Offers Procurement, Engineering Service

G. V. TAGGART

Relco Services, Inc., has been chartered in Oklahoma City to offer land acquisitions, right-of-way procurement, engineering, construction, and public relations services throughout the oil country. Graham V. Taggart, formerly with Coates Field Service, has been appointed vice president and general manager of the company. David E. Ray, formerly of Anderson-Prichard Oil Corp., has joined the company's operating staff.

The firm will specialize in cross-country land acquisition involved in pipeline and power transmission systems.

Dutney Named Assistant To Nordberg President

G. V. DUTNEY

Appointment of George V. Dutney as special assistant to the president has been announced by Robert E. Friend, president, Nordberg Manufacturing Co., Milwaukee. Dutney will make his headquarters in the company's New York office.

Dutney was associated with Jones & Laughlin Steel Co. in various capacities until 1920, when he joined Johns-Manville on the Pittsburgh management staff. He was later in Cleveland and New York. In 1929, Dutney became a partner in Rankin-Dutney Corp. who handled Johns-Manville contract and warehouse activity in Cleveland, Detroit, Pittsburgh, and Cincinnati, acting as executive vice president and sales manager. After selling the company to Johns-Manville in 1935, he returned to that firm in Philadelphia where he remained for 7 years.

For the past 12 years, Dutney has been on the Johns-Manville headquarters staff in New York. He transferred his affiliation to Nordberg Manufacturing Co. on April 1, and will be special representative of the president in sales and special public relations.

Continental Completes Sterling Plant Near Garber

Officials of Continental Supply Co. and Sterling Oil Co. of Oklahoma, Inc., participated in ceremonies recently when Continental completed and turned over to Sterling, the operators, a new gasoline plant near Garber, Okla. Among others attending were: L. S. Reid, Sterling; Wicliff Skinner, Sterling; R. A. Brewer, Continental; R. D. Mannix, Continental; Drew Cornell, Sterling; E. F. Gray, Sterling; R. E. Scheibel, Continental; Paul Montgomery, Sterling; Bill Bayerlein, Continental; and Nicholos D. Marko, Continental.

Robinson, Hawkins Named To New Macco Posts

J. M. ROBINSON

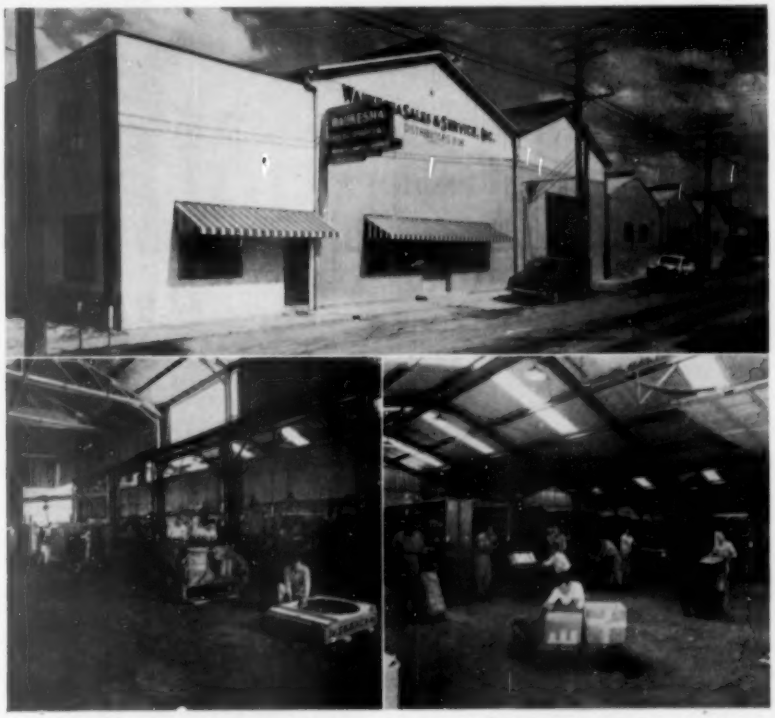
J. D. HAWKINS

John M. Robinson has been made general sales manager of Macco Corp., Paramount, Calif., according to E. A. Pellegrin, executive vice president. James D. Hawkins will succeed Robinson as manager of the drilling fluid division. In his new capacity, Robinson will work in close cooperation with Pellegrin in directing the sales efforts of all Macco divisions.

Robinson joined Macco in October 1945, and was appointed manager of the drilling fluid division in 1946.

Hawkins, formerly with Union Oil Co. for 16 years, became affiliated with Macco in 1948 in the drilling fluid division. He was appointed sales manager in 1951.

Waukesha Completes Warehouse Addition



Waukesha Sales & Service, Inc., has completed an addition to its headquarters in Houston which gives the company 11,000 additional feet of warehouse space. The addition is between the shop building and the Wilson building at the extreme right of top picture. Parts are received at the Houston headquarters to be stored or repacked and sent to Waukesha Sales & Service branches in Texas and Louisiana (lower right). Waukesha engines are repaired and serviced in the headquarters shop (lower left).

Mullestein Becomes Lukens General Manager of Sales

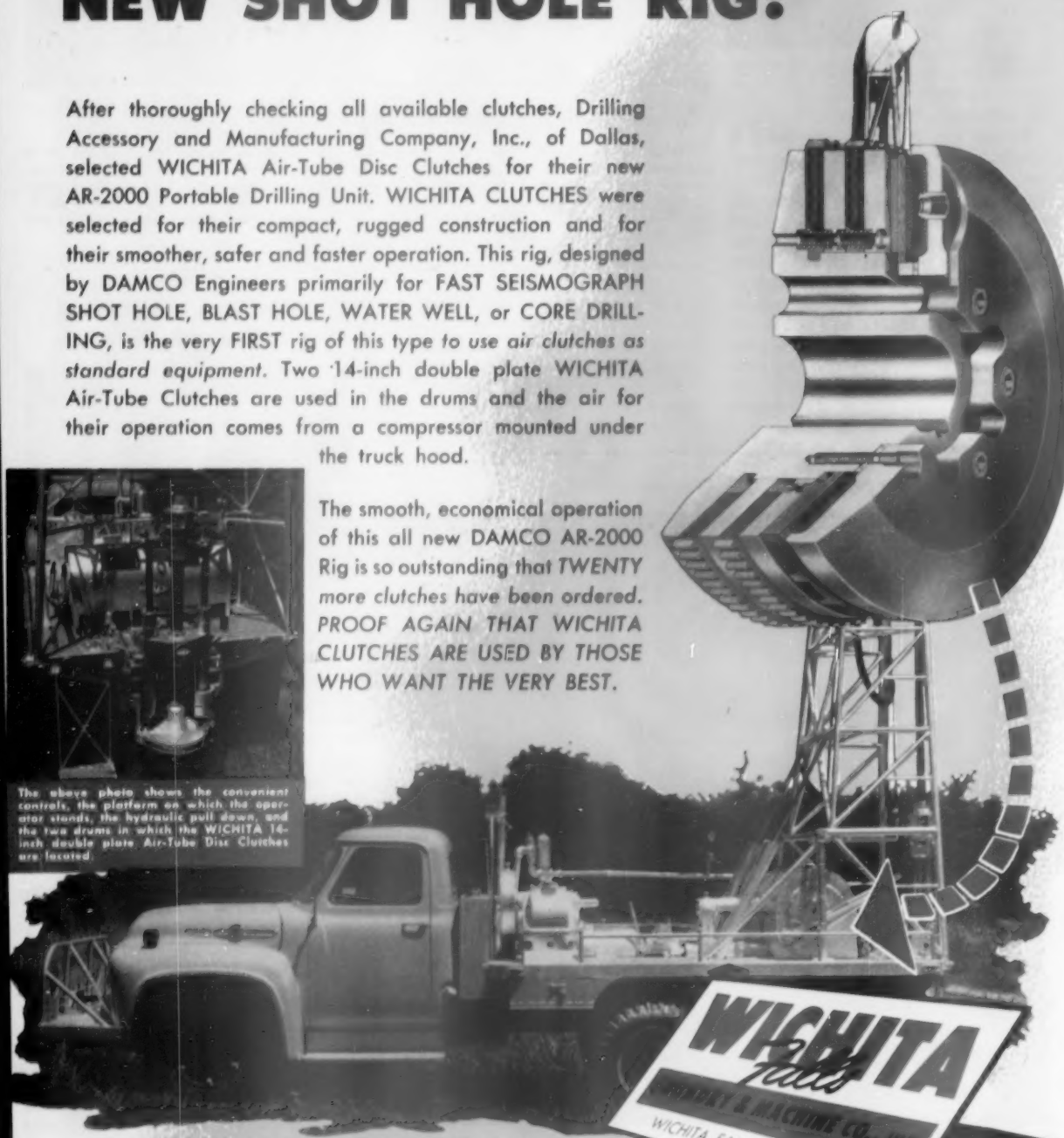
W. E. Mullestein has been named general manager of sales, Lukens Steel Co., Coatesville, Pa. Mullestein has been manager of field sales since May 1947. In his new position he will be a member of the company's management committee.

DAMCO Selects WICHITA CLUTCHES for NEW SHOT HOLE RIG!

After thoroughly checking all available clutches, Drilling Accessory and Manufacturing Company, Inc., of Dallas, selected WICHITA Air-Tube Disc Clutches for their new AR-2000 Portable Drilling Unit. WICHITA CLUTCHES were selected for their compact, rugged construction and for their smoother, safer and faster operation. This rig, designed by DAMCO Engineers primarily for FAST SEISMOGRAPH SHOT HOLE, BLAST HOLE, WATER WELL, or CORE DRILLING, is the very FIRST rig of this type *to use air clutches as standard equipment.* Two 14-inch double plate WICHITA Air-Tube Clutches are used in the drums and the air for their operation comes from a compressor mounted under the truck hood.

The above photo shows the convenient controls, the platform on which the operator stands, the hydraulic pull down, and the two drums in which the WICHITA 14-inch double plate Air-Tube Disc Clutches are located.

The smooth, economical operation of this all new DAMCO AR-2000 Rig is so outstanding that *TWENTY more clutches have been ordered. PROOF AGAIN THAT WICHITA CLUTCHES ARE USED BY THOSE WHO WANT THE VERY BEST.*



FOR MORE WICHITA CLUTCH DETAILS SEE YOUR NEAREST WICHITA ENGINEER

Brehm-Lahner, Inc., Detroit, Michigan
L. H. Fremont, Cincinnati, Ohio
W. G. Kerr Company, Pittsburgh, Pa.
Smith-Kerr & Co., (Main Office) West Hartford, Conn.
Smith-Kerr & Co., Philadelphia 44, Pa.
Smith-Kerr & Co., New York, N. Y.
Frank W. Tarline Co., Chicago, Ill.
Power Rig & Equipment Co., Inc., Long Beach, Calif.
Robert R. King Co., Cleveland, Ohio
John C. Burge, Oklahoma City, Oklahoma
Dominion Power Press Equipment, Ltd., Toronto, Ontario, Canada
Oil Field Motor Service, Alice, Texas
Hunt Tool Co., Houston, Texas
Industrial Air Controls Co., Ft. Worth, Texas
Dunigan Tool & Supply Co., Odessa, Texas

EXPLORATION

San Juan Strides Eastward

by Frank J. Gardner

THE Jicarilla Indian Reservation of northwestern New Mexico stole the oil-news spotlight in the southern Rocky Mountain area last week. It was no spectacular wildcat performance that was to blame. Indeed, a rather ordinary gas test caused a flurry of interest and wonderment, as Phillips Petroleum Co. ran production tests at its 1 Indian-E.

The indicated potential on the well, based on a 3-hour test, amounted to 20,200 M.c.f. of gas per day. In some oil centers that would hardly be news, but in the San Juan basin it meant the largest potential yet recorded from the Pictured Cliffs, an Upper Cretaceous sandstone that has produced gas in most of the fields in that basin. The operator has not officially confirmed the flow, but San Juan observers were impressed.

Why the Interest?

They were impressed for two big reasons: first, of course, the size of the potential. Previously, the average initial potential of wells in the Pictured Cliffs has been about 750 M.c.f. per day; potentials of 9,000 or 10,000 M.c.f. were, in the past, quite unusual.

Secondly, the location of the well is important. Located in Section 31-29n-3w, Rio Arriba County (arrow on map), it lies toward the northeastern flank of the basin and is 2 miles east of the nearest gas well and 10 miles northeast of the closest oiler. What implications this record well might hold for further eastward expansion of Pictured Cliffs production can only be surmised, but there is little doubt that if bigger flows reflect better sand conditions eastward, exploration will take a turn.

A Stratigraphic Problem

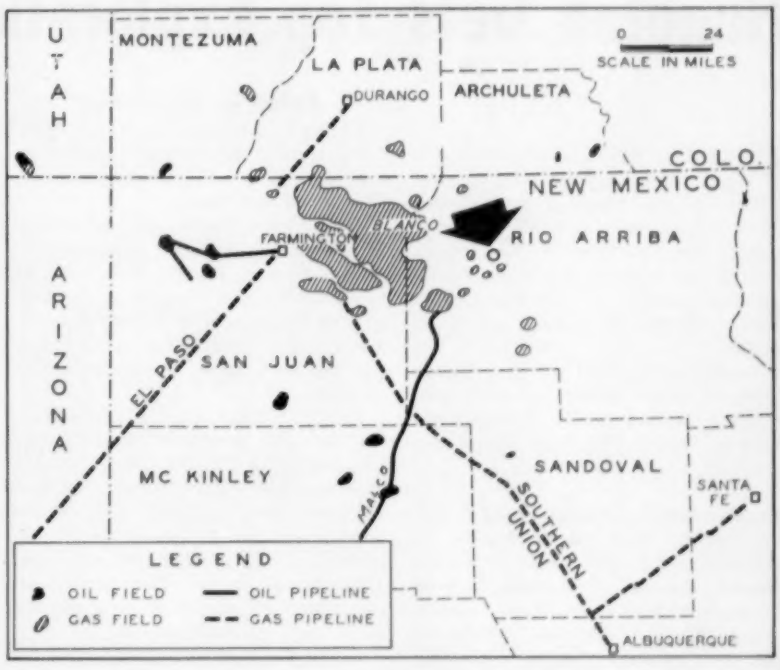
The gas at Indian-E is coming from the Pictured Cliffs at 3,882-3,905 ft., with top of the formation tentatively placed at 3,860 ft. Geologically, little is known of the eastward extent of these sands. The pays are tight, and porosity-permeability changes are more important to production than structure or sand thickness. Cement content and grain sorting call the tune for productivity, and notably lean areas are encountered within known productive field limits. Structures are small and localized, and seem to have little bearing on gas concentration.

In short, San Juan operators are faced with a problem of blanket occurrence of sand and gas in wide bands of porosity, wedging out, it is believed, on the subsurface to the northeast and east. Pictured Cliffs thickness varies from 50 to 500 ft., consisting of fine to medium-grained sand; the sands were laid down in oscillating seas, and finding the gas reservoirs therefore becomes nearly 100 per cent stratigraphic search.

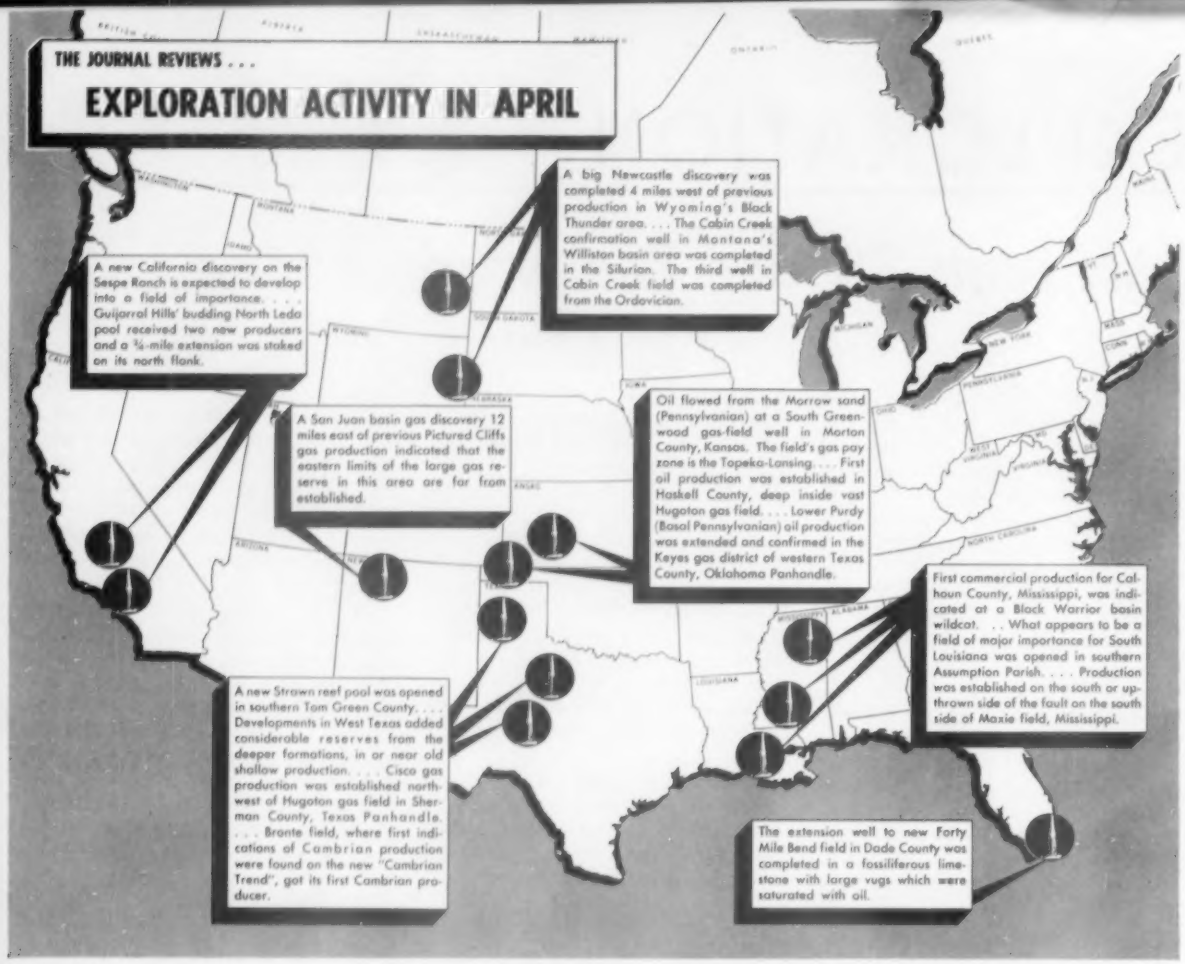
Nevertheless, recent wildcat drilling has inched production slowly eastward along the eastern flanks of Blanco field and half a dozen isolated gas strikes have been made to the southeast (see map).

How much gas is there? Too little development drilling and too little wildcat exploration preclude an answer. Guesses have been made—one in 1951 optimistically reached for 10 trillion cubic feet; current government reports show **proved** Pictured Cliffs reserves of 11 trillion. Predictions can be made, and guesses can be advanced, but step-outs like the Indian-E, with their implied promise, tend to dwarf official figures. now.

In 1925, Gypsy Oil Co. drilled the discovery well of Barker Creek field to the Dakota reservoir; it flowed 30,000 M.c.f. of sweet gas per day, and was plugged as noncommercial. Where that well fits into the gas-reserves picture of San Juan will never be known, but its abandonment is a prime illustration of the way times have changed. With the postwar whoosh of natural gas into the industrial picture, gas has become a prime target regardless of geography; market, industry, and transport factors follow the prospector now, and a 20,000-M.c.f. gas well makes the news.



Phillips Petroleum Co. 1 Indian-E has extended Pictured Cliffs gas production 2 miles farther east, with indicated potential larger than any heretofore recorded for that reservoir in the San Juan basin of New Mexico.


THE JOURNAL REVIEWS . . .
EXPLORATION ACTIVITY IN APRIL
A new California discovery on the Sespe Ranch is expected to develop into a field of importance. . . . Guijarral Hills' budding North Leda pool received two new producers and a ¾-mile extension was staked on its north flank.
A big Newcastle discovery was completed 4 miles west of previous production in Wyoming's Black Thunder area. . . . The Cabin Creek confirmation well in Montana's Williston basin area was completed in the Silurian. The third well in Cabin Creek field was completed from the Ordovician.
A San Juan basin gas discovery 12 miles east of previous Pictured Cliffs gas production indicated that the eastern limits of the large gas reserve in this area are far from established.
Oil flowed from the Morrow sand (Pennsylvanian) at a South Greenwood gas-field well in Morton County, Kansas. The field's gas pay zone is the Topeka-Lansing. . . . First oil production was established in Haskell County, deep inside vast Hugoton gas field. . . . Lower Purdy (Basal Pennsylvanian) oil production was extended and confirmed in the Keyes gas district of western Texas County, Oklahoma Panhandle.
First commercial production for Calhoun County, Mississippi, was indicated at a Black Warrior basin wildcat. . . What appears to be a field of major importance for South Louisiana was opened in southern Assumption Parish. . . . Production was established on the south or upthrown side of the fault on the south side of Maxie field, Mississippi.
A new Strawn reef pool was opened in southern Tom Green County. . . . Developments in West Texas added considerable reserves from the deeper formations, in or near old shallow production. . . . Cisco gas production was established northwest of Hugoton gas field in Sherman County, Texas Panhandle. . . . Bronte field, where first indications of Cambrian production were found on the new "Cambrian Trend", got its first Cambrian producer.
The extension well to new Forty Mile Bend field in Dade County was completed in a fossiliferous limestone with large vugs which were saturated with oil.

Hugoton Gets Top Exploration Billing

John C. McCaslin

EXPLORATORY developments in April were highlighted by new strikes in the Hugoton embayment. Other areas, pinpointed on the map, making the headlines in April were: West Texas, Florida, Wyoming, Williston basin, Black Warrior basin, Mississippi, South Louisiana, and California.

Total completions in the United States in April showed a small gain over the previous month. Wildcat completions totaled 893 wells, up 8 per cent.

Hugoton area . . . Stanolind Oil & Gas Co. opened first oil production in Greenwood gas field area of Morton County, Kansas. Production is from the Morrow sand in the basal Pennsylvanian. The new discovery is about ½ mile east of Baca County, Colorado. Previous production in the area was from the Topeka-Lansing. The Morrow oil strike greatly augments recent developments in the Pennsylvanian in the four-state area of Kansas, Colorado, Oklahoma, and Texas.

Helmerich & Payne, Inc., established Mississippian lime oil production in Haskell County, Kansas, at 1 Jones, 11 miles southwest of nearest oil production at Beyer pool in Finney County. The discovery, a deep test inside Hugoton gas field, opens the county's first oil pool.

Cabot Carbon Co. completed 1 State-Williams unit in western Texas County, Oklahoma, for 210 bbl. of oil per day from the lower Purdy sand. The well confirms the discovery well, Cities Service Oil Co. 1 Turner "A," completed last year for 205 bbl. of oil and 1,201 M.c.f. of gas. The strike is located between Northwest Eva and the Keyes area gas and oil pools.

In the Texas Panhandle Humble Oil & Refining Co. 1 Stratford Gas Unit, 7 miles northwest of Stratford and northwest of Hugoton gas field, was rated for a daily potential of 21,500 M.c.f. of gas from the Cisco. The new gas discovery has been confirmed and extended 1 mile.

West Texas . . . Stanolind opened new Strawn reef production at 1 Hoblet-Jacobs Ranch Co., 5 miles south of Christoval. The importance of the well is the possibility of its opening a new area comparable to the prolific Hulldale fields directly south of it in Schleicher County.

Cities Service Oil Co. 1-K TXL in the southwestern tip of South Cowden (San Andres) field, Ector County, flowed 1,186 bbl. of oil per day on completion in the Ellenburger at 12,-883-908 ft. The well is ringed by 4,000-ft. producers. In Crockett County Pure Oil Co. 35 Vaughn in a San Andres producing area 10 miles northwest of Ozona tested oil throughout a 208-ft. Ellenburger section. The thick pay section and heavy oil flow indicated the

Total April Completions, Exploration and Development

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
Ala.-Ga.-Fla.	9	1	0	8	1	2	5	0	1	0	51,491	7
Arkansas	55	26	2	27	10	31	10	4	0	0	217,505	33
California	212	151	3	58	45	92	46	15	12	2	1,002,566	240
Colorado	107	62	4	41	1	10	92	3	1	0	604,803	130
Illinois	234	114	0	120	93	141	0	0	0	0	563,743	388
Indiana	75	27	0	48	69	6	0	0	0	0	121,195	106
Kansas	402	204	37	161	47	345	10	0	0	0	1,351,840	501
Kentucky	96	40	26	30	52	44	0	0	0	0	223,019	144
Louisiana	246	167	17	62	97	24	32	41	35	17	1,494,895	405
North	148	109	8	31	97	15	23	11	2	0	446,740	169
South	98	58	9	31	0	9	9	30	33	17	948,155	236
Michigan	27	8	1	18	18	5	4	0	0	0	67,282	121
Mississippi	36	14	0	22	0	3	22	7	3	1	263,012	36
Montana	19	12	0	7	3	7	2	5	2	0	110,592	37
Nebraska	23	11	0	12	0	3	20	0	0	0	127,161	45
New Mexico	70	34	18	18	10	25	20	9	4	2	384,720	114
New York	50	25	0	25	50	0	0	0	0	0	30,000	40
North Dakota	20	11	0	9	0	4	0	11	5	0	162,890	32
Ohio	97	52	9	36	57	40	0	0	0	0	172,424	171
Oklahoma	804	505	41	258	307	378	78	34	7	0	2,623,994	1,282
Pennsylvania	107	24	45	38	68	5	33	1	0	0	376,851	174
South Dakota	3	1	0	2	2	0	0	1	0	0	11,595	4
Texas	1,525	895	54	576	369	566	382	156	38	14	6,899,818	1,275
N. Central (7-B & 9)	629	328	8	293	270	252	101	5	1	0	2,024,677	332
West (7-C & 8)	314	236	6	72	22	119	96	50	17	10	1,805,938	406
Panhandle (10)	60	47	4	9	2	55	1	1	1	0	205,251	32
East (5 & 6)	87	31	13	43	7	33	35	11	0	1	470,387	107
Gulf Coast (2 & 3)	205	121	15	69	11	35	85	59	14	1	1,346,059	214
Southwest (1 & 4)	230	132	8	90	57	72	64	30	5	2	1,047,506	184
Utah	6	1	0	5	3	1	0	1	1	0	24,376	39
West Virginia	44	8	28	8	24	18	2	0	0	0	117,231	171
Wyoming	105	74	1	30	9	33	51	10	2	0	553,474	217
Miscellaneous	§23	19	0	4	22	0	1	0	0	0	30,754	¶24
Total April 1954	4,395	†2,486	286	*1,623	1,357	1,783	810	298	111	36	17,587,231	‡5,736
Total March 1954	4,388	2,563	304	1,521	1,295	1,745	861	289	144	54	18,185,355	4,736
Cumulative 1954	17,326	9,817	1,184	6,325	5,155	6,938	3,260	1,267	506	200	71,504,637	
Cumulative 1953	14,831	7,627	1,147	6,057	4,379	6,134	2,598	1,135	446	139	61,192,273	
Western Canada	150	90	9	51	35	64	43	5	3	0	610,765	
Alberta	89	60	6	23	12	27	42	5	3	0	431,119	
Saskatchewan	41	18	3	20	11	29	1	0	0	0	131,409	
Manitoba	19	12	0	7	12	7	0	0	0	0	45,627	
B. C.-N.W.T.	1	0	0	1	0	1	0	0	0	0	2,610	

*Incl. 92 service wells: Calif. 3, Kans. 6, N. Y. 25, Ohio 11, Okla. 33, Pa. 12, N. Tex. 1, S.W. Tex. 1. †Incl. 43 condensate wells: Calif. 2, S. La. 9, Miss. 1, Okla. 3, W. Tex. 1, E. Tex. 2, Gulf Coast 12, S.W. Tex. 13. ‡Incl. all wells rigged up and/or drilling at month's end. §Mo. 19 oil, 3 dry; Ariz. 1 dry wildcat. ¶Incl. Mo. 10, Md. 3, Nev. 11.

. . . the Month's Wildcats

	Total	Oil	Gas	Dry	Footage	1954 Comp.	1954 (1,000 ft.)	1953 Comp.	1953 (1,000 ft.)
Ala.-Ga.-Fla.	9	1	0	8	51,491	36	203	30	158
Arkansas	13	1	2	10	66,279	44	176	37	152
California	49	5	1	43	243,784	205	998	217	997
Colo.-Utah-Wyo.-Mont.	71	13	0	58	391,170	271	1,548	179	1,016
Tri-States	74	4	0	70	148,842	257	489	262	517
Kansas	67	9	2	56	271,506	215	846	289	1,069
Louisiana	36	11	5	20	312,074	157	1,479	140	1,256
North	15	1	2	12	82,310	43	239	42	242
South	21	10	3	8	229,764	114	1,240	98	1,014
Michigan	12	1	0	11	25,313	85	182	74	199
Mississippi	13	0	0	13	86,598	47	308	74	534
Nebraska	9	2	0	7	48,970	38	203	49	251
New Mexico	15	1	2	12	91,632	62	491	55	359
North Dakota	9	0	0	9	70,610	23	138	13	71
Oklahoma	63	13	1	49	258,183	256	1,124	236	1,059
South Dakota	3	1	0	2	11,595	7	32	3	13
Texas	440	62	11	367	2,081,987	1,715	8,533	1,707	8,316
North Central	204	24	3	177	686,460	712	2,486	702	2,487
West	62	13	1	48	395,428	324	1,942	261	1,533
Panhandle	7	0	0	7	40,529	25	156	11	52
East	27	1	3	23	147,365	91	539	94	452
Gulf Coast	61	10	2	49	439,692	271	2,033	304	2,173
Southwest	79	14	2	63	372,513	292	1,377	335	1,619
Others	10	1	3	6	45,703	40	178	41	150
Total April 1954	893	125	27	741	4,205,737	3,458	16,928	3,406	16,117
Total March 1954	818	135	25	658	4,056,122				
Cumulative 1954	3,458	507	103	2,848	16,928,131	3,458	16,928		
Cumulative 1953	3,406	496	124	2,786	16,117,219			3,406	16,117

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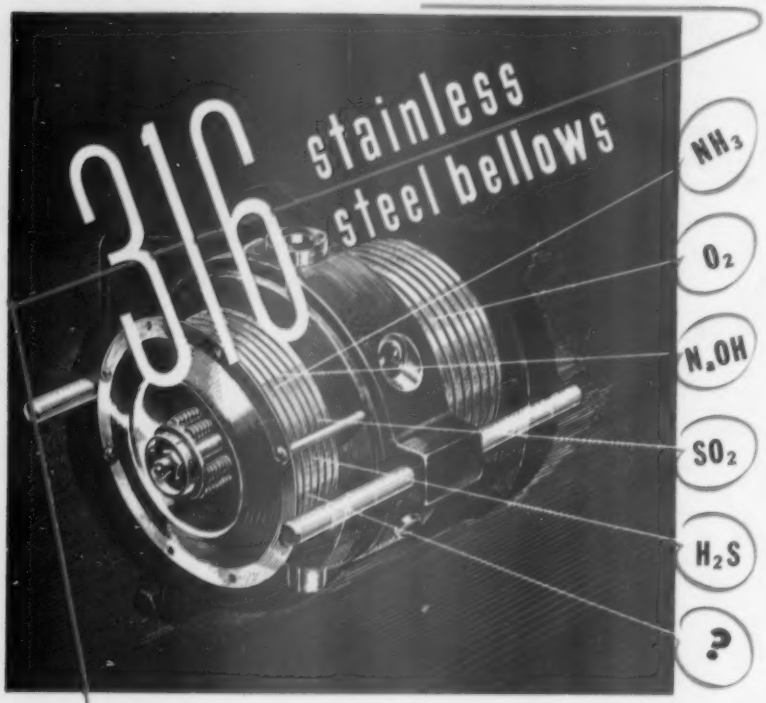

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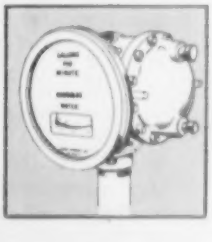

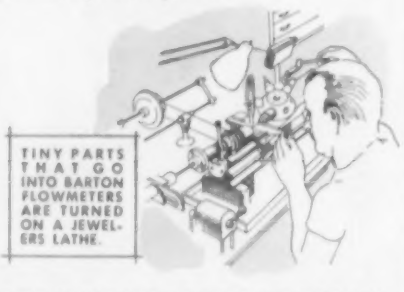

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possibility of another structure on the order of Elkhorn-Ellenburger field, 5 miles northwest.

Humble Oil & Refining Co. 5 Keeney in Bronte field, east-central Coke County, was completed flowing 414 bbl. of Cambrian oil in 18 hours. First Cambrian indications in the new trend were found at Bronte. The new well is the second Cambrian producer in Coke County; the other is in Rawlings field to the north.

Florida . . . Gulf Oil Corp. completed 1 State of Florida-Lease 340 in the Forty Mile Bend field area of Dade County.

The extension discovery pumped 112 bbl. of 21.2°-gravity oil per day from open hole at 11,340-52 ft. The well is located about 3½ miles east of the pool's discovery well.

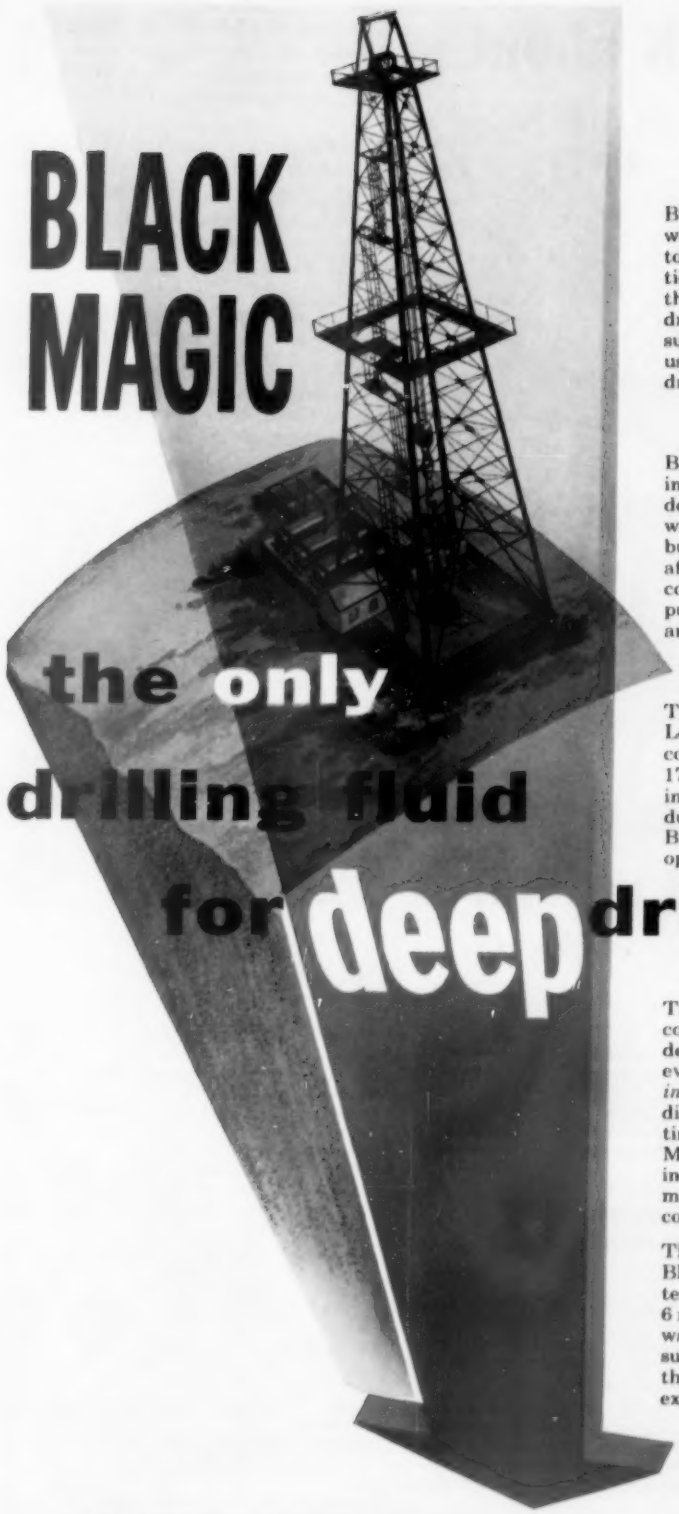
Wyoming-Montana . . . True & Brown and R. H. Fulton completed a big discovery 4 miles west of previous production in Weston County, Wyoming's Black Thunder area. The wildcat was finaled for a flow of 800 bbl. of oil per day in the Newcastle sand. It is northwest of the axis of the Clareton field producing trend, and is west of dry holes on the western edge of previous Newcastle production through the Black Thunder area of Clareton field.

Shell Oil Co. completed the confirmation well to Cabin Creek field in Fallon County, Montana, for 259 bbl. of oil daily from the Silurian. It is the northwest offset to the discovery well, completed for 244 bbl. of oil per day from the Ordovician. Shell also completed another well in the field for a flow of 226 bbl. of oil daily from the Ordovician.

Black Warrior basin-Mississippi . . . Indications of another Black Warrior field in Mississippi were given by promising gas and condensate showings found at Honolulu Oil Corp.'s rank Calhoun County wildcat. The shows were in the Abernathy zone of the Chester series. The prospective strike is first in the county and the first this year in the basin. Location is nearly 20 miles west of Chickasaw County production.

Gas sands amounting to a total of 58 ft. were found by Ohio Oil Co.'s Maxie field test in Forrest County. Production is from the Eutaw and lower Tuscaloosa. The well is located on the south side of the field.

Coastal Louisiana . . . Union Oil Co. of California opened a new oil field 7 miles northeast of Morgan City. The discovery well was completed in Mio-



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Black Magic replaced the clay-water mud at 10,955 ft. in Ohio Oil's well at Paloma and was used to total depth of 21,482 ft. Bottom hole temperature at 20,003 was 334° F. and flow line temperature was 175° F., but basic properties of the Black Magic were not affected. Mud maintenance time was negligible and costs extremely low. At this same depth, the maximum pump pressure was only 1,700 psi. Accurate electric and radiation logs were obtained.

RICHFIELD'S WORLD'S DEEPEST PRODUCER

The last 8,000 ft. to TD of 17,895 in this well at Coles Levee in Kern County, California was drilled and cored with Black Magic. The producing interval is 17,500-17,895 feet from the Eocene. It came in flowing to become the world's deepest commercial producing well. Casing (7") was run and cemented in Black Magic at 17,500—one of the deepest cementing operations that has ever been performed successfully.

DEEP TEST WELL, STONE COUNTY, MISSISSIPPI

The most striking example of the low maintenance costs achieved with the use of Black Magic during deep drilling took place in this well—the deepest well ever drilled in the Gulf Coast and *the third deepest well in the world*. At 14,670 ft. the water base mud was displaced with Black Magic and diamond coring continued to TD of 20,450 ft. Average cost for Black Magic and mud materials was less than $50 a day, including transportation. With the water base mud, mud conditioning time required 12 to 16 hours per core and mud materials averaged over $600 per core.

The hole was shut down for 6 months and stood full of Black Magic without circulation with a bottom hole temperature of 389° F. On going back into the hole, 6 months later, there was no solidification. Circulation was broken at 15,000 ft. with only 600 psi pump pressure. Mud properties were practically identical to those at the time of shutdown. No other mud in existence has ever approached that performance.

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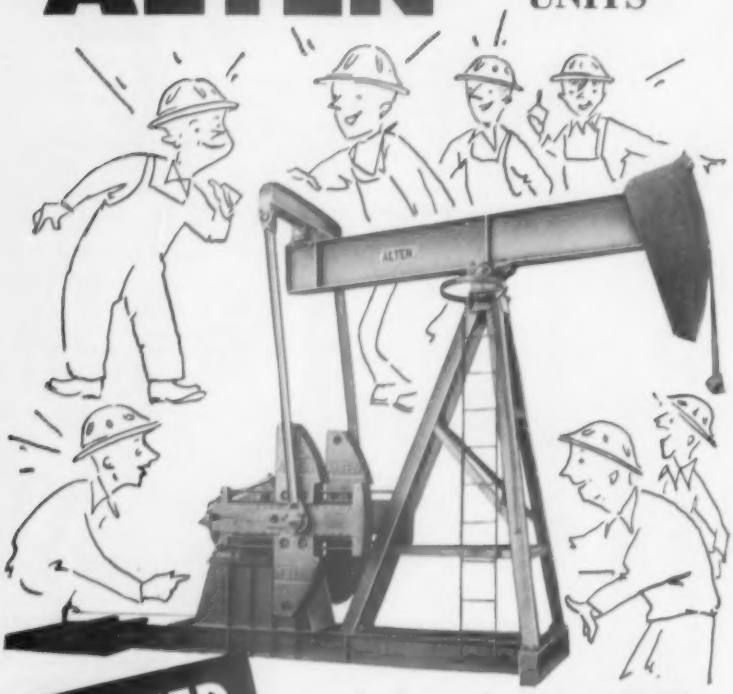

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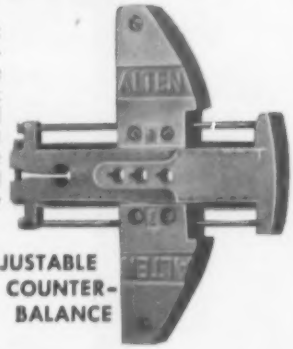

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cene sand at 13,385-97 ft., flowing at the rate of 250 bbl. of oil per day. Nearest oil-producing area is at Chacahoula, 6 miles east.

West Coast . . . Standard Oil Co. of California's wildcat on the Sespe Ranch, 5 miles west of Fillmore, resulted in a new 14,000-ft. discovery. It is not in the class of Ventura Avenue, but is expected to develop into an important area. The wildcat flowed at the rate of more than 500 bbl. of oil per day from a Pliocene sand.

Standard Oil Co. of California completed 85 27F about ½ mile west of Fresno County's new North Leda pool for 940 bbl. of oil daily during a 16-hour test period. A southwest offset to the discovery flowed 989 bbl. of oil per day on a 9-hour test. Outcome of a ¾ mile extension wildcat on the north flank of the pool, Los Nietos 87 Guijarral Service, is expected to shed considerable light on the pool's importance.

In the San Juan basin, Southern Union Gas Co. 2-A Jicarilla, Rio Arriba County, New Mexico, was estimated to be good for 10,000 M.c.f. of gas per day from the Pictured Cliffs sand. The gas discovery is 12 miles east of previous production from this formation. Tubing pressure on tests was 987 psi., a new high for the basin. Another wildcat is drilling southeast of the strike.

MICHIGAN

The first follow-up test, and the south 40-acre offset to McClure Oil Co. 1 Kohn, Reed City-Dundee zone oil discovery well, Reynolds Township, Montcalm County, was on Dundee top at this report and was checked in about 6 ft. higher on this important marker than the discovery.

This first follow-up, McClure Oil Co. 1 Long, SE NE SW 1-12n-10w, logged Dundee at 3,234 ft. Long string of 5-in. casing was set at 3,313 ft.

Efforts to kill and deepen further in the Trenton were in progress this week at the Edward Torosian 1 Nerreter, SE SE NE 2-1s-7e, Northville pool, Salem Township, Washtenaw County, but difficulty was being experienced in getting the well killed to allow for deepening. This semi-outpost showed for an official 11,000,000 cu. ft. of gas a day from a Trenton pay logged at 4,315 ft. Well is located a flat mile northwest of the W. C. Taggart 1 LeMaster, Northville pool flowing Trenton oil well. First attempt to kill gas flow at the 1 Nerreter with water failed. Hole cleaned itself in 5 minutes. Next attempt to kill gas flow was made with about 198 sacks of mud. A Baker plug was being run to allow for recementing 5-in. casing. Well started to show strength enough to clean itself again and plug was fired and set at 728 ft. It was impossible to get plug to required depth with well not adequately under control. Contractor was drilling on the plug at last report.

KANSAS

New Pool In Kingman County Indicated

Aylward Drilling Co. and Aurora Gasoline Co. have an indicated discovery in western Kingman County at 1 Amsden, SW SW SW 11-29s-9w, 5 miles southeast of nearest production in Pat Creek pool.

Recovery on a drill-stem test in the Viola lime at 4,501-06 ft. was 970 ft. of free oil and no water. Recovery on a second test in the Viola at 4,506-11 ft. was 2,580 ft. of gas and 125 ft. of slightly muddy, gassy oil. Bottom-hole pressure was 1,450 psi.

A new pool has been opened in eastern Kingman County at M. B. Armer 1 Davis, NE SE SE 32-29s-6w. The well was completed flowing 144 bbl. of oil daily from the Kansas City lime.

New Harper County Discovery Indicated

Pickrell Drilling Co. and J. A. Mull, Jr. 1 Campbell, NE NE NE 36-31s-9w, is a new Harper indicated discovery, 1 mile southeast of South Grabs pool.

Recovery on a Mississippi drill-stem test at 4,366-80 ft. was 200 ft. of free oil, 280 ft. of gassy, muddy oil and 30 ft. of water. Another test taken at 4,382-4,402 ft. recovered 120 ft. of gas-cut mud, 60 ft. heavily oil and gas-cut mud and 180 ft. of muddy oil. The third test at the wildcat, taken at 4,404-25 ft., recovered 1,620 ft. of gas, 180 ft. slightly oil and gas-cut mud, 105 ft. of heavily oil and gas-cut mud and 375 ft. of water.

Harper Ranch Extension Flows Oil and Gas

Pure Oil Co. 1 Harper, C SW NW 2-34s-21w, ¾-mile east stepout at Harper Ranch pool in southeastern Clark County, southwestern Kansas, flowed 1½ bbl. of oil per hour and 3,500 M.c.f. of gas. Production is from the Morrow sand. Testing continues.

Morton County's First Oil Well Completed

Stanolind Oil & Gas Co. has opened first oil production in Morton County in extreme southwestern Kansas at 1-C U.S.A., C SW 29-34s-43w.

The well pumped 252 bbl. of oil per day from Purdy sand (basal Morrow) perforations at 4,192-4,200 ft. and 4,210-16 ft., based on 8-hour test. The discovery is 1¼ miles east of the Baca County, Colorado line and about 7 miles northeast of Keyes gas-distillate production in Cimarron County, Oklahoma. It is located in South Greenwood gas field.

New Pools Named

Names have been given to eight new oil and gas pools in Kansas by the Nomenclature Committee.

In southern Kansas Church pool was opened in Cowley County by Saco Oil Co. at 1 Church, SW SE SW 13-31s-6e. The pool is producing from the Mississippi. On the southwest flank of the Central Kansas uplift in Edwards County Wokaty pool was opened at Cities Service Oil Co. 1 Wokaty, NE SE NE 25-25s-17w. The well gaged 3,310 M.c.f. of gas per day from conglomerate.

On the uplift in Ellis County Transit Corp. 1 Huck, SE SE NW 31-11s-20w, opened South Nicholson pool for 213 bbl. of oil per day from the Arbuckle. In Graham County Southeast Happy pool was opened by Wickizer 1 Wickizer, NW NW NE 28-10s-23w, as a Lansing producer. Stafford County's new pool is Brenn, opened by Heathman-Seeligson 1 Brenn, NE NE SW 19-23s-13w, as a Lansing producer. In Trego County South Spaulding pool was opened by Magnolia Petroleum Co. at 1 Spaulding, SW NE SE 1-11s-21w. Production is from the Lansing lime.

Helmerich & Payne, Inc. 1 Jones, pool opener at Pleasant Prairie, opened first oil production in this Hugoton field area. The discovery well was finaled for 168 bbl. of oil per day from the Mississippian.

In the Sedgwick basin Rosedale pool was opened by Armer & Midstates 1 Davis, NE SE SE 32-29s-6w, Kingman County. The pool opener flowed 144 bbl. of oil per day from the Lansing.

Seward Wildcat Reports Shows in Toronto

Panhandle Eastern Pipeline Corp. 1-4 Boles, 4 miles west of Liberal, recovered gas shows in the Toronto lime (Pennsylvanian). The well is an old one, completed in 1930 in the regular Hugton gas Permian pay. It is 14 miles south of Holt pool, a Pennsylvanian Toronto gas producer completed this year as the first Pennsylvanian pool in the Kansas sector of the Hugoton gas field.

INDIANA

In Posey County, 7 miles northwest of Mt. Vernon, L. F. Wilson 1 Aldridge, SE NW SE 4-6s-14w, is drilling at 2,160 ft. after a

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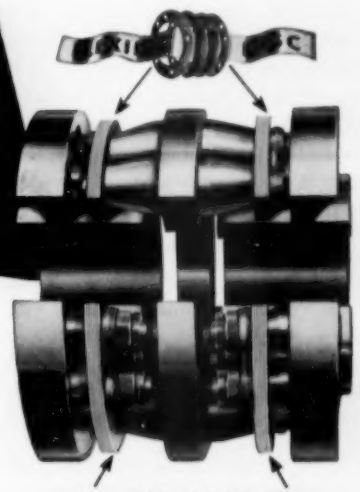

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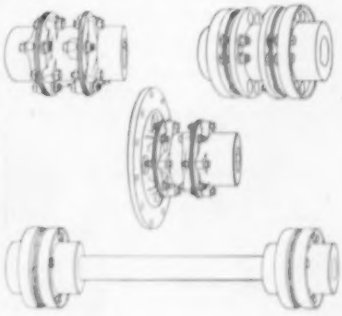

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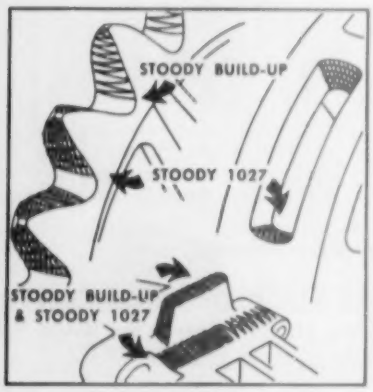
Shovel down-time is reduced. Only enough time is lost to pull worn assemblies and substitute the spares. Shovels are immediately put back on the job.

Although no exact record is available, careful observation over a long period of time indicates an almost indefinite increase in service life for these specific parts. The procedure has proved so successful it is now adopted as standard practice.



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drill-stem test in the Pennsylvanian sand recovered 300 ft. of gas, 290 ft. clean oil. The wildcat is ½-mile step-out from production.

APPALACHIAN AREA

WEST VIRGINIA

In Jumping Branch district, Summer County, West Virginia, United Fuel Gas Co. 1-6788 J. Sanford Lilly, deep rank wildcat, elevation 2,613 ft., was dry with no oil or gas reported, Corniferous lime 7,880-7,943 ft., Clifton Forge 8,121-8,180 ft. TD 8,185 ft. Numerous fishing jobs made this well an expensive operation.

McComas district, Cabell County, West Virginia Gas Corp. 5-576 Gill-Porter wildcat, elevation 603 ft., resulted in a dry hole, Oriskany sand 3,482-3,542 ft., show of gas 3,420 ft., and 3,540 ft., Red Medina 4,670-4,775 ft., TD 4,790 ft. Beaver Pond district, Mercer County, United Fuel Gas Co. located 1-8010 Edward Combs, wildcat, elevation 2,756 ft., Bluefield Quadrangle, 4.75 miles south of latitude 37 degrees 25 minutes and 1.80 miles west of longitude 81 degrees 10 minutes.

PENNSYLVANIA

Buffalo Township, Washington County, Southwest Pennsylvania. The equipment is being changed preparatory to starting of deepening operations in 1 Kelly-Southerland, which had been drilled to 7,184 ft., by Washington Oil Co.

OHIO

A shallow shale pool, probably similar to Senecaville, has been found in Wayne Township, Noble County. Virgin Watson et al 1 reached the pay at 496 ft. and drilled in to 506 ft., and is reported to be pumping and flowed 60 bbl. oil per day.

A second small gasser has been completed in Monroe Township, Ashtabula County. Russell McConnel et al 1 A. Puska, Lot 15, made 250,000 cu. ft. natural and shut-in after shot at the same gage with 1,000 lb. pressure. Clinton was logged at 3,045-3,129 ft.

Oxford Oil Co. 6 E. R. Foucht, Section 13, Thorn Township, Perry County, with Clinton at 2,766-2,795 ft. made 3 bbl. natural and 160 bbl. in 24 hours after fracturing.

KENTUCKY

WESTERN KENTUCKY

In Union County, 3 miles west of Uniontown, Walter Duncan and Marion Dome are drilling ahead at 1 Alvey, 21-P-18, after a 3½-hour drill-stem test at 2,819-32 ft. in the Aux Vases recovered 120 ft. clean oil and 15 ft. of mud-cut oil, no water.

EASTERN KENTUCKY

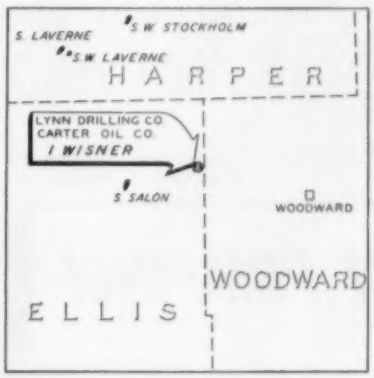
Crate Rice et al are testing a prospective new wildcat discovery in 19-P-74, Wolfe County. Bruce Rose 1 is currently reported pumping from 15 to 20 bbl. of oil daily from the Carniferous lime at a total depth of 1,664 ft. Top of Corniferous was logged at 1,484 ft. Well is located several miles east of the old Stillwater pool.

In Martha pool of northwestern Johnson County, Mullins and West have a 5-bbl. pumper at their 11 Ira Lester. Producing formation is the Mississippian Weir sand 995 ft. to 1,037 ft. Well is located on the west edge of the pool in the Keaton section.

OKLAHOMA

Show Reported at Ellis County Wildcat

Lynn Drilling Co. and Carter Oil Co. 1 Wisner, (arrowed on map) C SW NE 12-23n-23w, Ellis County, reported a show of gas on drill-stem test.



The important wildcat, 12 miles northwest of Woodward, flowed gas at the estimated rate of 60 M.c.f. per day on drill-stem test at 7,893-96 ft. Recovery on the 2-hour test was 130 ft. of heavily gas-cut mud and 990 ft. of slightly salty water. The operators are drilling ahead.

The wildcat is located in the all-but-dry northwestern portion of the Anadarko basin. Only other production in Ellis County is at South Salon pool. Several miles northwest of the test in Harper County there is gas-distillate production at South and Southwest Laverne fields, and some gas production at Southwest Stockholm pool.

Committee Names New Pools At Regular Meeting

The Oklahoma Nomenclature Committee met recently, giving names to new pools in the state.

In Kay County, northern Oklahoma, East Basin Oil Co. 1 Cope, SE NE SW 22-28n-1w, opens Sumpter pool. In Lincoln County, Oklahoma Natural Gas Co. 1 Moore, NW NW SE 21-17n-2e, opens Olivet pool. In East-Central Oklahoma's Okfuskee County Cyclone Drilling Co. 1 Shealey, NE NE SW 9-12n-8e, opens Southwest Valley Grove pool.

In the Osage Country Tom Palmer 1 Osage, NE NE NW 8-25n-6e, opens West Little Chief pool. Oras A. Shaw 1 Osage, SW NE SE 30-26n-6e, opens Northwest Little Chief pool. In Pawnee County Signal Oil & Gas Co. 1 Crosby, SE SE SE 14-22n-5e, opens Northeast Buena Vista pool. In Payne County Creslenn Oil Co. 1 Thompkins, NE SE NE 6-19n-1w, opens Middle Orlando pool. Also in Payne Royal Oil & Gas Corp. 1 Robinson, NE NE NW 28-19n-5e, opens Northeast Pratt pool.

East Sturgis field was opened by Cabot Carbon Co. 1 State-Williams Unit, SE SE NW 30-5n-10eCM.

Southeast Camrick Field Extension Well Finaled

United Producing Co. has extended Southeast Camrick field in Texas County 3 miles northeast at 1 Loren Sillars, NW SE 36-2n-19eCM.

The well flowed a calculated 23,000 M.c.f. of gas per day from Morrow sand perforations at 6,752-72 ft. The well is 13 miles southeast of Hardesty.

A 7,350-ft. Mississippian test will be drilled in the field by American Gas Producing Co. at 1-A Squires, SW SW NE 17-1n-19eCM. The wildcat, 5 miles southeast of Hardesty, is 1 mile south of The Texas Co. 1-B Silsbee. This well made 26,500 M.c.f. of gas per day from the Morrow, natural. Following fracture the good well flowed 42,200 M.c.f. of gas per day.

New Map

The Austin Map Co., 415 Bewley Building, Fort Worth, Tex., has published a new geological map of the Anadarko basin of Kansas, Oklahoma, and Texas Panhandle.

Structure contours shown are on the top of the Mississippian formation for the states of Kansas and Oklahoma. Those shown for Texas are on the top of the Panhandle Big Lime (Permian). Datum, mean sea level.

CANADA

Five Tests Highlight Week's News in Canada

Five drillers in two of western Canada's provinces highlighted the Canadian oil industry during the past 7 days, bringing indications of oil and gas discovery or extension. Those wells include ventures in the Sturgeon Lake, Kathyrn and Sarcee areas of Alberta, and in the Eastside and Frobisher regions of Saskatchewan.

Sturgeon Lake . . . In the southern extension region of Sturgeon Lake, in northwest Alberta, the Hudson's Bay Oil & Gas Co., Ltd., and Union Oil Co. of California team rated a 3¼-mile oil extension success at a driller on a 100,000-acre crown reservation farmout acquired from the Liberal Petroleums Ltd.-Mic Mac Consolidated Oil & Gas Co., Ltd., et al team. The well is about 85 miles south of Peace River townsite, and has indicated upwards of 200 ft. of productive D3 Devonian reef.

This significant new strike, which extends the Sturgeon Lake producing area some 3¼ miles to the southeast, is Hudson's Bay 15-31 Liberal, LSD 15, 31-68-21w5. The reef was entered at 8,276 ft., some 29 ft. higher than the Amerada "Y" F well to the northwest. That Amerada oil success encountered about 180 ft. of oil zone. Initial drill-stem test in the pay formation yielded a recovery of over 4,000 ft. of 35°-gravity oil and crew was coring and testing at 50-ft. intervals over the weekend.

Meanwhile, that same team's other step-out venture on the same reservation tract, No. 12-27, was reported logging favorably in the Green shale, and it was expected that initial drill-stem tests in the D3 would be conducted at weekend. This venture is 2¾ miles southeast of the new extension. Prospects for a sizable oil zone in the reef are also favorable.

Kathyrn area . . . Southern Alberta natural gas reserves were further boosted this week, with the discovery of a large gas flow from the Devonian at a wildcat in the Kathyrn area and flow tests at a Sarcee wildcat yielding gas in excess of 31,000,000 cu. ft. daily. The Sarcee venture also gave up recovery of some distillate.

The Devonian strike, indicated during drill-

stem test about 6 weeks ago, was made at Socony-Vacuum Exploration Company's C.P.R. 3-2 Kathyrn exploratory well, LSD 3, 2-26-28w4, 10 miles northeast of Calgary. After perforating casing between the interval 8,200-76 ft., in the Crossfield member of the Devonian (D1), and treating with 2,000 gal. of acid, it is reported that gas flow rate was between 8,000,000 and 10,000,000 cu. ft. daily. Flow testing was continuing at latest reports.

This well, in its earlier stages of drilling, had given a gas showing in the Belly River, between 3,088-3,152 ft., and some evidence of oil in the basal Blairmore from tests of intervals 6,900-22 ft. and 7,031-62 ft., but as yet neither of those formations have been production tested.

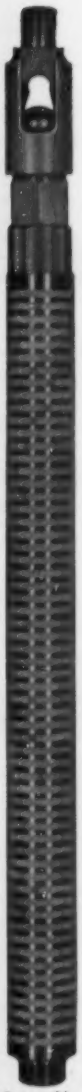
Sarcee . . . On the Sarcee Indian Reserve, 13 miles southwest of Calgary and 9 miles north of western Canada's first major oil and gas field—Turner Valley, the joint Shell Oil Co. and Home Oil Co., Ltd.'s 1 Sarcee well rated a combined gas flow rate of 31,200,000 cu. ft. from the two porous zones in the Rundle (Mississippian) limestone. The combined condensate flow rate during those production tests was 12 bbl. per million cu. ft.

During an 18-hour test in the lower porous zone, of the perforated interval 9,780 to 9,956 ft., the Sarcee well (after a 12,500-gal. acid treatment), flowed at rate of 16,500,000 cu. ft. daily. Condensate recovery was 7½ bbl. per million cu. ft.

The upper porous zone in the Rundle, was perforated from 9,607-80 ft., given a 4,500-gal. acid shot, and flowed gas at rate 14,700,000 cu. ft. daily, with condensate recovery of 4½ bbl. per million cu. ft. during 7-hour test.

Saskatchewan . . . In southwest Saskatchewan, 35 miles west of Kindersley and 11 miles northwest of Marengo area wells that found gas in the Viking and some oil in the detrital, the team of Phillips Petroleum Co. of Oklahoma and Husky Oil & Refining, Ltd., discovered natural gas in the Banff sand. This gas strike, Phillips-Husky 13-14 Eastside, LSD 13, 15-29-29w3, topped the Banff sand at 2,913 ft., encountered about 15 ft. of productive sand above the water, and flowed at rates up to 1,930,000 cu. ft. during drill-stem tests.

At Frobisher, this week Canadian Gulf Oil Co.'s wholly owned ½ mile east step-out from the Quinn Mission Canyon oil discovery well indicated at least 20 ft. of oil section in that same formation. The discovery found about 12 ft. of oil pay zone. In addition to being assured of Mission Canyon oil, the 11 Moffatt well, LSD 11, 35-3-4w2, also indicated oil production higher in the Mississippian (in the Charles member), earlier this month. The well was continuing to test and core. Latest reported tests, down to 4,680 ft., gave up recoveries of both oil and water, after well had flowed 37°-gravity crude to the surface. It is understood that a later test gave up only salt water recovery.



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TEXAS

EAST TEXAS

Neches Pool Is Active Spot in Anderson County

Sun Oil Co. and The Texas Co. have entered the active play in the new Neches pool northeast of the town of Neches, Anderson County. At this report, a count of active rigs showed 5 drilling and 3 wells in the completion stage. Fourteen locations had been staked for immediate drilling.

Sun's first attempt in the area is 1 Mrs. Lela Boyling, in William B. Harrison Sur., A-348. A 30-minute drill-stem test in the sub-Clarksville at 4,648-78 ft. recovered 1,470 ft. of oil and 80 ft. of mud. Maximum flowing pressure reached 920 psi. and 15-minute shut-in pressure was 1,955 psi. Operators cored Woodbine sand from 4,770-86 ft., following the test, then ran a drill-stem test which recovered salt water. Drilling continued below 4,900.

The Texas Co. will enter the field drilling at 1 Verna Marten, as a 6,000-ft. Woodbine test. Location is on a 286.5-acre lease in the John H. Scaggs Survey, A-709.

Anderson County . . . Lowton Oil Corp. 1 Les Qualls "A," J. W. Orr Survey, in the Reka field, gaged 480 bbl. of oil in 24 hours through ½-in. choke from Pettit perforations between 6,826-68 ft. Tubing pressure was 180 psi.

In the same area, Carter-Gragg Oil Co. completed 2 Anderson for a daily potential of 167 bbl. through 11/64-in. choke, with tubing pressure at 400 psi. and gas-oil ratio of 529 cu. ft. Pettit pay was between 6,836-77 ft.

NORTH CENTRAL TEXAS

Montague Discovery Is Completed

The Texas Co. 1 Fenoglio, approximately 2 miles southwest of Montague, has been completed for 180 bbl. of oil in 16½ hours, from conglomerate pay. The flow was through 20/64-in. choke, from pay at 6,650-60 ft. Gas-oil ratio was 400 cu. ft.

Jack County . . . Star Oil Co. 1 Henderson, 7½ miles northwest of Jacksboro, flowed 344

bbl. of oil a day through 18/64-in. choke, to open a new Caddo area. The test was from perforations at 5,010-18 ft., tubing pressure was 250 psi. and gas-oil ratio was 635 cu. ft.

Grayson County . . . Midwest Oil Corp. completed one discovery and was drilling ahead on an offset test. The finished well is 1 G. L. Crockman, 1 mile west of Southmayd, which flowed 240.5 bbl. of 25° oil a day through ⅜-in. choke. Pay section was perforated from 6,602-15 ft., and gas-oil ratio was 610 cu. ft.

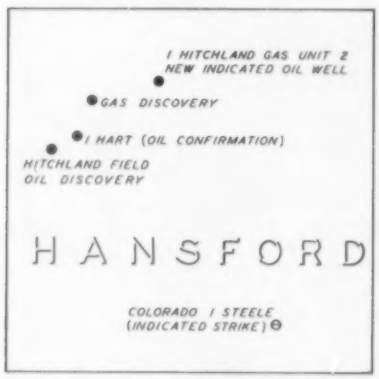
The new well is 1 E. C. Anderson, approximately 2 locations south of the discovery, and also in the D. S. Southmayd Survey. C. B. Morris & Associates, Wichita Falls, had drilling under way, on 6,800-ft. contract.

Continental Oil Co. 1 Stinson, offsetting a new discovery, 2 miles northeast of Whitesboro, swabbed and flowed 110 bbl. of new oil in 8 hours, following a fracture treatment through perforations at 6,406-37 ft.

TEXAS PANHANDLE

New Hansford Strike

Humble Oil & Refining Co. 1 Hitchland Gas Unit 2 (Frazier), 4½ miles southeast of Hitchland and 2¼ miles northeast of nearest production in Hitchland field, is a new oil



discovery for Hansford County (see map).

The well flowed 72 bbl. of oil in 2½ hours, then flowed 57 bbl. of oil in 13 hours through ¼-in. choke. Flow followed acidization.

Five miles east of Gruver in the East Gruver area of Hansford County, Humble 1 East Gruver Gas Unit 5 was showing for first oil production in this field. After fracturing the well swabbed 32 bbl. of oil in 10 hours. Production from both wells is Pennsylvanian.

Sherman County Extension Well Testing Cisco Section

Humble Oil & Refining Co. 1 Dortch, 8½ miles northwest of Stratford, northwestern Sherman County on the northwest flank of Hugoton gas field, is testing as a field extension well to the recent Cisco discovery in the area.

It is located 2½ miles northwest of the discovery well of new Stratford field. Humble Oil & Refining Co. 1 Stratford Gas Unit 3, ½ mile south of the discovery well of the field, is still testing the Cisco. Very little gas has shown.

Hitchland Field

Humble Oil & Refining Co. opened Hitchland field last winter at 1 Collier, 4 miles southeast of Hitchland field. The discovery well pumped oil from the Douglas sand perforations at 4,639-43 ft. The second well in the new Pennsylvanian field was the 1 Collier "B." It flowed 14,100 M.c.f. of gas per day from the Douglas. Humble just confirmed oil production in the field at 1 Hart. It pumped 4 bbl. of oil per day. The Hitchland gas unit 2 (Frazier) is the fourth well in the field.

Potential Taken at Deep Quinduno Test

Gulf Oil Corp. has re-completed the 1 John Haggard, opening a third pay zone in Quinduno field, Roberts County, Texas Panhandle.

The well flowed 230 bbl. of 70°-gravity distillate plus 16,300 M.c.f. of gas per day from the Pennsylvanian granite wash at 7,248-60 ft. Gas-oil ratio is 70,833:1.

This well was completed in 1952 for 125 bbl. of oil per day from perforations at 6,736-42 ft. It was reentered last year after a fall in production. The well was taken deep into the Arbuckle, but plugged back to 7,270 ft.

WEST TEXAS

Spraberry Fields Are Again Active

Spraberry completions were in the news again, with two good wells making extensions to field limits.

Davison & Pembrook 2 Kerr estate, 4-E-L&SV, in the northwestern corner of Reagan County, and northeast of the Weddell area, completed for a daily potential of 888 bbl. of 41° oil a day. The daily gage was based on an actual 8-hour flow of 296 bbl. of oil through ½-in. choke, from open hole between 7,148-7,234 ft., total depth. Gas-oil ratio was 410 cu. ft. and tubing pressure was 350 psi.

Southland Royalty Co. 3-9 W. E. Boyd, 1 mile southeast of the above well, also extended production with a daily calculated potential of 410 bbl. of 45° oil. On a 15-hour flow test the well made 256.49 bbl. of oil through ⅝-in. choke, from open hole between 7,146-7,186 ft. Tubing pressure was 600 psi. and gas-oil ratio was 1,700 cu. ft.

Edwin Pauley has filed application to drill 1-13 Hicks to 8,000 ft. Location in 13-E-HE&WT may establish a northwest-southeast trend from Davison 2 Kerr, or a long east extension to Weddell field.

Scurry reef discovery . . . M. L. Mayfield 1 Jordan, 599-97-H&TC, has been completed as a reef discovery. Potential was 186 bbl. of 41° oil a day through 10/64-in. choke from perforations at 7,948-58 ft. Tubing pressure was 430 psi. and gas-oil ratio was 1,325 cu. ft. Sample top on the reef was 7,875 ft., minus 5,050 ft.

Gas shows in Reeves wildcat . . . Gulf Oil Corp. et al 1 Toyah Unit (Shurtleff), deep wildcat southwest of Pecos, entered the Devonian at 12,553 ft., minus 9,730 ft., by samples, and drill-stem tested from 12,558-12,626 ft. Gas showed in 30 minutes, increasing to 126,000 cu. ft. per day at the end of the test. Recovery was gas-cut mud, with no shows of oil.

Midland County . . . Forest Oil Corp. and Cities Service Oil Co. 1 Dora Roberts "C-4" has reported slight oil and gas shows in the Ellenburger. Sample top on the formation was 13,076 ft., minus 10,171 ft., and the test was run from 13,067-13,133 ft. Recovery was

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SOUTHWEST TEXAS

Catahoula Sand Produces In New Nueces Discovery

Completion of a new Catahoula oil-discovery well, located southeast of London field, 12 miles southwest of Corpus Christi, in Nueces County, is reported by Christie, Mitchell & Mitchell.

The well, 1 Crook, in Section 26, Laureles Farm Tracts, is rated good for 102.07 bbl. of 30.1°-gravity oil daily, flowing through 9/64-in. choke with pressure of 375 psi. and gas-oil ratio of 375 cu. ft. per bbl.

Catahoula sand is perforated at 4,554-60 ft. Hole had been drilled to 10,052 ft. Casing was run to 4,745 ft.

Since completion, locations have been made for three additional tests in the area, designated as Southeast London field. These include west and south offsets by the discovery operators, and a southwest offset by Chicago Corp. and Republic Natural Gas Co.

Aransas Gas Discovery

Sam E. Wilson, Jr., and Jay Callahan 1 Ocker Brothers, discovery well of Sam Wilson field, 8 miles southwest of Austwell, Aransas County, produced at the rate of 6,000,000 cu. ft. of gas daily during open-flow potential tests. The well is shut in with 2,654-psi., pressure on the tubing. Total depth is 10,051 ft. with pay interval at 7,442-48 ft. Condensate recovery was at the rate of 1 bbl to 27,800 cu. ft. of gas. Location is 4 miles northwest of Blackjack field, nearest production.

SOUTHEAST NEW MEXICO

Roosevelt County Offset is Failure

Amerada Petroleum Corp. 1 Floyd Vincent, southeast offset to its 1-C discovery in Roosevelt County, threw a damper on the new field when it tested water in the Devonian. Formation tops below the Abo at 7,000 ft. had not been determined but the well apparently ran considerably low to the discovery.

A drill-stem test from 10,215-10,295 ft., open 1 hour, developed water blanket and mud-cut salt water. The company's discovery had top of the Devonian at 9,213 ft. and completed for 186 bbl. of oil a day with no water from a pay section between 9,229-70 ft. Location is between Lightcap and New Hope fields.

In Lea County, Jake L. Hamon and Warren Petroleum Corp. completed 1 Davis-Federal for a calculated daily potential of 720 bbl. of oil. On final test the well made 270 bbl. of oil in 9 hours through 1-in. choke, with gas-oil ratio of 547 cu. ft. Pay is open hole between 12,140-12,171 ft. Top of the Devonian by samples was 12,068 ft., on elevation of 3,994 ft. The new well is 2 miles southeast of Devonian production in Knowles field.

ILLINOIS

In Wabash County, Hoyt Lovelace recovered 490 ft. of clean oil in the lower Cypress at 1 Shumate, NE SW NW 2-1s-13w, 4 miles northwest of Mt. Carmel.

LOUISIANA

SOUTH LOUISIANA

Lake Washington Field Adds Deep Oil Producer

John W. Mecom is completing another good producer in continued active development of deep sands around the flanks of Lake Washington Dome, in Plaquemines Parish.

The well, 16 Cockrell, on the north side, is a producer from two zones, the No. 19 sand at 13,038-58 ft., and the No. 25 sand at 13,604-14 ft.

From the shallower sand, it flowed 499 bbl. of 31.1°-gravity oil daily through ¼-in. choke with 1,000-psi. pressure and gas-oil ratio of 613 cu. ft. per barrel. From the lower sand, the flow was 477 bbl. of 27.3°-gravity oil daily with 2,075-psi. pressure and gas-oil ratio of 328 cu. ft. per barrel.

In the meantime, testing is under way in potentially productive deeper zones encountered by Richardson & Bass at their 3-E State Lease 1891, in wildcat area off the extreme southwest flank of the dome. Water is reported to have been recovered in initial tests of a possible pay interval at 15,709-43 ft. but this interval since has been cemented and reperforated only to 15,715 ft. Hole originally was drilled to 16,889 ft.

New Gas-Condensate Area Opened at Grand Chenier

Forest Oil Corp. is opening a new gas-condensate field southwest of the Grand Chenier area, in southern Cameron Parish, where its 2 Miller has completed successful tests in two zones, one at 11,144-52 ft. and the other at 9,918-25 ft.

From the lower sand, the well flowed at the rate of 1,225,000 cu. ft. of gas daily through 8/64-in. choke with 47°-gravity condensate at the rate of 20 bbl. per million cubic feet. Tubing pressure gaged 3,800 psi.

Flow from the upper sand was at the rate of 1,125,000 cu. ft. of gas daily with 30 bbl. of 50.2°-gravity condensate per million cubic feet. Bottom-hole pressure, flowing, ranged from 4,115 to 4,460 psi.

Location is 2,250 ft. west of the company's initial test, 1 Miller, indicated gas-condensate discovery well, which was junked and abandoned last December following a blowout after drilling to 13,330 ft.

The company already has made location for its third test in the area to be drilled south of the blowout well on the same lease.

New Oil Field Uncovered By Jeff Davis Discovery

H. L. Hunt has a new oil-discovery well in Jefferson Davis Parish. It is his 1 McKinley Augustine, located 4 miles northwest of Fenton, in the northwestern part of the parish. Discovery is in a sand interval at 8,921-31 ft., from which the well is rated good for 200 bbl. of oil daily, flowing through 8/64-in. choke under pressure of 2,400 psi. Pay is in hole drilled to 10,452 ft. and plugged back to 10,100 ft. Location, in 2-8s-6w, is 6 miles north of Woodlawn field. The same operator is starting another deep wildcat test about 2 miles to the southwest at 3 Lock-Moore, in Section 9.

TENNESSEE

H. P. David's wildcat near Briceville blew in an estimated 5,000 M.c.f. of gas per day,

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The well has been capped temporarily and the gas piped to a safe distance. The gas is being burned at present. The gas flow was hit at 3,045 ft. in a dolomite on top of the Devonian. The well is located on a 30,000-acre tract of land leased from the Coal Creek Mining and Manufacturing Co. Casing has been ordered to case off the gas so that drilling can be resumed. Operators are hopeful of making an oil well.

CALIFORNIA

Grass-Roots Flurry In Tulare County

A shallow pool discovery made in the Terra Bella area of Tulare County last December has grown to the stature of a minor drilling flurry. Seven wells last week were in process of completion or being drilled in the 3-mile interval between NE NE 9 and NE SW 27-22s-27e. Three wells completed at depths of about 850 ft. were averaging about 20 bbl. of low-gravity crude daily.

In NE NE 9, Navy Oil Co. 1 Navy showed prospects of producing from upper Miocene sands at 820-1,015 ft. J. W. Douglas 1 Hornbrook was yielding some 17°-gravity crude on swabbing tests of a 770-ft. sand in NE SW Section 27. Valley Oil Co. 1 Culver was under way in NE NW Section 21, about 1 mile northwest of the McGreevy-Neary Oil Co. discovery in SE SE Section 22. Two tests also were nearing completion in Section 15, while McGreevy-Neary had wells under way in Section 22 and 27.

Fresno County Outpost Nearing Completion

Standard Oil Co. of California 83 27F was in process of being completed in SE NE 27-20s-16e as a two-location north extension to the new North Guijarral Hills field. Top of the Leda sand was called at 8,650 ft., where 7-in. casing was being cemented after bottoming hole at 8,656 ft.

About ½-mile north of this site Los Nietos Co., operator 28-22 Guijarral Service was coring at 8,789 ft. in SE SE Section 22. Successful completion of this wildcat would establish the pool's north-south production limits at more than 1¼ mile. An additional four rigs were at work in the pool, which now contains eight producers.

Belgian Anticline Test Staked

Tide Water Associated Oil Co. was preparing location for a ¼-mile northwest outpost to Northwest Belgian Anticline field of westside San Joaquin Valley. The test will be an "84" location in SE NE 16-30s-21e. It will search for Phacoides (Lower Miocene) and Oceanic (Oligocene) production at depths of about 4,000 ft. A. J. West has completed six wells in these pays on Tide Water fee-owned property in W½ Section 15.

New Bandini Pool in Prospect

General Exploration Co. apparently has made a new pool discovery at the two-well Bandini field in eastern Los Angeles. Its 3 C.C.M.O. found the prospective oil sand at 5,395-5,590 ft., some 800 ft. above the 6,277-6,317 ft. Repetto sand in which the discovery was made last August. Operator at last report was cleaning out to 5,590 ft. after having drilled the slant hole to a total depth of 6,600 ft. Location is in 17-2s-12w, about 1 mile west of East Los Angeles field.

ROCKY MOUNTAIN

NEBRASKA

Kimball County Pool Opener Tested

Eddie Fisher, Brush Colorado independent recovered 4,980 ft. of free oil on 1-hour drill-stem test of 1 Hafeman, SE SE NE 23-14n-55w, Kimball County, for an apparent discovery 5 miles southeast of the town of Kimball. Test was of the "J" sand interval 6,185-6,203 ft. In addition to the oil, 120 ft. of water was recovered. Flowing pressure was 1,000-1,485 psi. Total depth is 6,210 ft., and the operator has set pipe and is preparing to complete.

The recovery on core 6,174-6,210 ft. included 19 ft. of medium grained porous and permeable sand, with good saturation through most of the interval. The well is 4 miles south of production in Owasco pool. There has been very little previous drilling in the township, with the majority of exploration emphasis in this area having been to the north and west of the Fisher discovery.

The discovery is the second in recent weeks in the township. Natural Gas & Oil, Inc., of Denver has swabbed at the rate of 28 bbl. of

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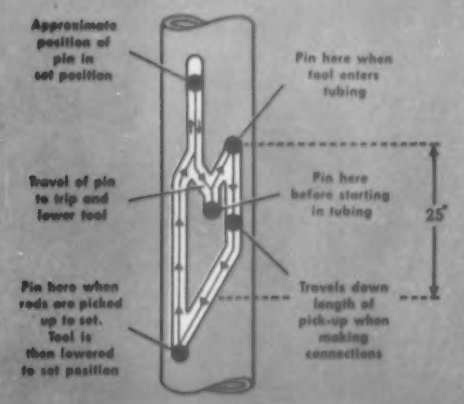
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oil per hour for a 7-hour test at 1 Durland, C NE NW 5-14n-55w. This well also found production in the "J" sand with top at 6,306 ft. It is now installing production equipment.

Two Cheyenne County Discoveries Completed

The Ohio Oil Co. has completed two recent Cheyenne County discoveries. At 1 Lobb, NW NW SW 3-12n-51w, a flow of 3,070,000 cu. ft. of gas per day was reported. The pool opened by this well has been designated Lodgepole field.

Ohio also completed an oil discovery in the general West Sidney gas area. This well, 1 O'Connell, NE NE SW 31-13n-50w, pumped 56 bbls. of oil per day. The total recovery was 30 per cent water cut. Production is from "J" sand 5,006-20 ft.

NORTHERN NEW MEXICO

Eastern San Juan Basin Discovery Tested

Phillips Petroleum Co. recovered gas at a rate of more than 20,000,000 cu. ft. per day on test of 1 Indian E, SE NW NE 31-29n-3w, Rio Arriba County. The well produced from Pictured Cliffs, with the top of the formation tentatively called at 3,860 ft. The daily potential was based on a 3-hour test, and is reported as the largest gage ever obtained from Pictured Cliffs in the San Juan basin.

The well is 2 miles east of nearest production. Exploration in the San Juan basin during the past year has steadily pushed producing limits eastward, but a majority of previous discoveries were completed for much smaller gages. This operator's activity has been increased in the basin during the past several months as a result of commitment of acreage to the proposed Pacific Northwest Pipeline.

COLORADO

Wildcat West of Adena Is Apparent Success

Lion Oil Co. reported a flow of oil after 65 minutes of drill-stem test of "J" sand at 1 Bruce, SE NE NW 26-1n-58w, Morgan County. The discovery is more than 1 mile west of production at Adena South. Test was of the zone 5,763-74 ft. Tool was open for 75 minutes and the rate of oil recovery was not reported. Recovery in pipe was 240 ft. of oil and gas-cut mud and 30 ft. of water. Flowing pressure was 240-710 psi. The operator cored 13 ft. of sand with good stain and fair porosity, and a lower zone of 12 ft. with no show and at last report was drilling below 5,774 ft. The Adena area has been the most active in the state, both from a development and exploration standpoint during 1954.

Logan County Discovery Completed

McDermott and Barnhart reported a pump gage of 199 bbl. of oil per day on test of 1 Armstrong, C SW NE 34-9n-53w, Logan County. The well found production in the "J" sand. It is about 6 miles northeast of Sterling.

New Map

The Austin Map Co., 415 Bewley Building, Fort Worth, Tex., has published an excellent new geological map of the Paradox basin of southwestern Colorado, southeastern Utah, northeastern Arizona, and northwestern New Mexico.

Structure contours are shown on the top of the following formations as indicated by state: Utah-Chinle (Triassic). Colorado-New Mexico-Dakota sandstone (Cretaceous). Arizona-Kaibab limestone (Permian). All unsurveyed federal land in the state of Utah has been shown with a dashed township and range line.

Washington County Discovery Testing

C. A. Floto (Benedum-Trees) pumped 99 bbl. of oil in 24 hours at 1 Neiman, SW SE SE 11-1s-55w, Washington County. Production was from the interval 4,784-88 ft. The operator is continuing to test this discovery which is east of principal production in the county.

WYOMING

New Green River Basin Exploration Planned

General Petroleum Corp. has made location for two wells along the overthrust belt on the west side of the Green River basin. One is scheduled as the initial test of the Buckhorn Unit, and will be drilled in NE SW SE 28-25n-109w, Sweetwater County. It will test Mesaverde at about 7,500 ft. General Petroleum has also made location for a Nugget test at 12-26 Government, SE NW SW 12-28n-114w, in the Tip Top area of Sublette County. Location is ½ mile southeast of a Nugget producer which was completed for about 450 bbl. of high (61°)-gravity oil per day.

MONTANA

Northern Montana Wildcat Has Madison Show

Union Oil Co. of California and Carter Oil Co. recovered 10 ft. of oil and 135 ft. of 50 per cent oil-cut mud on test of 1 Tribal 544, C NW NW 19-37n-8w, Glacier County. The top of Madison was found at 4,689 ft., and test was of the interval 4,696-4,713 ft. Tool was open for 2 hours. Gas at the rate of 70,000 cu. ft. per day was gaged after 8 minutes. At last report the well, which is west of Cut Bank field was coring below 3,740 ft.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: Armstrong & Horn and M. E. Andrews 1 Tullos, L. B. Tallaferro Sur. 1956, A-1383. IP 131.10 BOPD, ⅛-in., 38.2°, Navarro 5,261-81 ft. (perforations). TD 5,297 ft. (New field in Charlotte area.)

Big Six Drilling Co. 2-B Nisbett estate, B. Littleton Sur. 1610, A-1562. IP 38.11 BOPD, 5/32-in., 38.6°, open hole 3,840-58 ft. TD 3,858 ft. (Extends Big Foot field.)

Harry W. McCormick 1 McAda, Minnie B. Murphy Sur. 66, A-1546. Dry. TD 5,802 ft.

Texita Oil Co. and Tri-Mark Oil Co. 1 Zork, William McFadden Sur., 523, A-556. Dry. TD 5,442 ft.

Bastrop County: Pasadena Oil, Inc., 1 Ezra Cleveland, Ezra Cleveland Sur. Dry. TD 1,117 ft.

Bexar County: B. M. Jacobs 1 Hartl, Mariana Sequin Sur., A-19. IP 267.3 BOPD, ¼-in., Austin Chalk (crevice) 2,900-3,037 ft. (open hole). TD 3,037 ft. (New field.)

Dimmit County: Tal Vez Oil Co. 1 McKnight, I&GN Sur., A-901. Dry. TD 2,579 ft.

District 4

Aransas County: George W. Graham and Emory M. Spencer, William S. Tutton Sur., A-202. Dry. TD 10,000 ft.

Brooks County: Bass & Vessels 1 Atkinson, Tract 4, Partition of Juan Garza Trevino Lands, Loma Blanco Grant. Dry. TD 7,605 ft.

Duval County: Carrl Oil Co. and Shore Exploration Co. 1 Villareal, Lot 4, Sec. 54, Copita Farm & Garden Tracts. IP 17,000 M.c.f. daily, plus ungaged condensate, open-flow potential, 60°, Queen City 5,494-96 ft. (perforations). TD 5,715 ft. (New field—West Sejita.)

Cresslenn Oil Co. 1-A Marshall, Blk. 3, Sec. 59, Copita Farm & Garden Tracts. Dry. TD 5,250 ft.

Sid Katz 1-G Peters, J. M. Tigert Sur. 321. Dry. TD 2,640 ft.

Schimmel Drilling Co. 2 Parr, Tract 3, La Huerta Sur., A-227. Dry. TD 6,250 ft.

Hidalgo County: Magnolia Petroleum Co. 4 Santa Cruz Farms, Blk. 64, Santa Cruz Farms Subd. Unit 3, San Salvador del Tule Sur. IP 36,000 M.c.f. daily, open-flow potential, plus ungaged condensate, 55.2°, Frio 7,508-22 ft. (perforations); and 11,000 M.c.f. daily, open-flow potential, plus ungaged condensate, 60°, Frio 8,836-60 ft. (perforations). TD 9,070 ft. (New pay in San Carlow field.)

Jim Hogg County: J. J. Pichinson, trustee, 1 Guerra, Blk. 7, Las Cuevitas Grant, A-135. Dry. TD 2,816 ft.

Jim Wells County: Russell Maguire and R & S Oil Co. 1 Hawkins, Blk. 6, Share 4, San Diego de Arriba Grant. Dry. TD 6,717 ft.

Nueces County: Renwar Oil Corp. et al 1 Folda, trustee, Lot 8, Sec. 7, Bohemian Colony Lands Subd. Dry. TD 10,016 ft.

Webb County: American Republics Corp. 1-28 Billings, Blk. 1, CCSD&RGNG Sur. 38. Dry. TD 2,650 ft.

O. W. Killam 112 Bruni estate, Blk. 10, Ranchito Pasture, Borregos Grant. Dry. TD 1,624 ft.

Zapata County: Carl E. Johnson 1 Jennings, San Antonio de Mira Flores Grant. Dry. TD 4,015 ft.

Miller & Pierce 1 Vela, Blk. 6, Share 3, Don B. Adams Subd., El Grullo Grant. Dry. TD 4,250 ft.

TEXAS GULF COAST

District 2

DeWitt County: Kirkwood & Co. 1-A Atkinson, John McCrabb Sur., A-32. Dry. TD 8,152 ft.

Live Oak County: Ada Oil Co. 1 Cartwright, Block 34, F. Detrick Sur., A-167 (Hinnant area). Dry. TD 6,516 ft.

Edwin Eckert et al 1 Englemann, Bridget Haughey Sur., A-9. Dry. TD 1,655 ft.

Victoria County: Homes Drilling Co. 1 Atkinson et al, F. H. Anderson Sur., A-499. Dry. TD 8,915 ft.

Kirby Oil & Gas Co. 1 Foster, T&NO Sur. 10, A-472. IP 6,250 M.c.f. daily, open-flow potential, Cockfeld 5,521½-28½ ft. (perforations). TD 8,517 ft. in Wilcox. (New field.)

District 3

Fort Bend County: Meredith & Co. 1 Gamble, J. W. Scott Sur., A-321. Dry. TD 8,065 ft.

H. C. Spoor, Jr. 1 Way et al, I&GN Sur. 1, A-365. Dry. TD 8,015 ft.

Harris County: Houston Oil Co. of Texas

WILDCAT COMPLETIONS

1-A Keller et al, William Whitlock Sur., A-85. IP 3,600 M.c.f. daily with 29 BC per M.M.c.f., open flow, 54°, Second Cook Mountain sand 8,982-89 ft. (perforations). TD 9,254 ft. (New pay in South Rankin field.)

Seaboard Oil Co. of Delaware et al 1 Allison et al, Block 109, Allison-Richey Gulf Coast Home Co. Subd., Thomas Green Sur., A-290. Dry. TD 9,020 ft.

Charles B. Wrightsman and Pat R. Rutherford 1-B Harris County Land & Improvement Co., Lot 17, Victor Blanco Sur., A-2. IP 182.16 BOPD, 9/64-in., 39°, perforations 8,052-55 ft. TD 8,972 ft. (New pay in Algo-Mag field.)

Jasper County: Edwin L. Cox 1 Marceaux, B. F. Smith Sur. 12, A-772. Dry. TD 7,225 ft.

Matagorda County: Jack W. Frazier and J. B. Ferguson 1 Pierce estate, Charles De Mosa Sur., A-24. Dry. TD 9,070 ft.

Orange County: W. V. Bowles & Co. 4 Gulf-Winfree fee, William Dyson Sur. IP 118 BOPD, 9/64-in., 24°, perforations 3,856-59 ft. TD 6,139 ft. (New pay in Orange field.)

Humble Oil & Refining Co. 1 Paraffine, H. Filley Sur. 6, A-80. Dry. TD 8,200 ft.

Tyler County: Humble Oil & Refining Co. 5-G East Texas Oil Co. fee, T&NO Sur. 1, A-806. IP 115 BOPD, X-29 choke, 41.4°, Wilcox 8,580-90 ft. (perforations). TD 8,695 ft. (Extends Hicksbaugh field.)

EAST TEXAS

Anderson County: Butler & Douglas 1 Gross, M. R. Palacios Sur., A-50. Dry. TD 5,303 ft.

Devon Leduc Oils, Ltd. 1 Barrett, Ignacio Aguilera Sur., A-5. Dry. TD 5,262 ft.

Cherokee County: Bill R. Tipton 1 Murray, Jose Musquez Sur., A-37. Dry. TD 4,770 ft.

Zephyr Oil Co. 1 Wollery, J. W. Trimble Sur., A-855. Dry. TD 4,817 ft., Elev. 361 ft., Woodbine 4,740 ft.

Fannin County: H. L. Hawkins 1 Shelton, John Yeary Sur. Dry. TD 4,150 ft.

Gregg County: Charles W. Lutes 1 Gaines, Leonard Perkins Sur. Dry. TD 8,069 ft.

Hunt County: D. V. Exploration Co. 1 Herron, John Loring Sur. Dry. TD 2,010 ft.

McLennan County: Hugh Hamilton and Dick Smith 1 Barron, J. H. Hatch Sur. Dry. TD 2,237 ft.

Marion County: N. E. Loomis 1 Haynes, Wm. Edmondson Sur., A-112. IP 71,000,000 cu. ft. gas, plus 11 bbl. distillate per 1,000,000 cu. ft., Gloyd perforations 6,016-42 ft. Shut-in tubing pressure 1,850 psi.

Navarro County: Gordon D. Clark 1 Estes, John McNeal Sur., A-8. Dry. TD 3,710 ft.

Shelby County: Finlayson, Mitchell & Stone 1 Jackson, O. G. Bruce Sur. A-111. Dry. TD 1,608 ft.

TEXAS PANHANDLE

Hansford County: Phillips Petroleum Co. 1 Harve, 16-5T-T&NO Sur. Dry. TD 7,350 ft.

Phillips 1 Higgs, 302-2-GH&H Sur. Dry. TD 7,530 ft.

WEST CENTRAL TEXAS

Brown County: R. D. Jackson and C. B. Frost Jr. 1 Wilson, J. L. Vaughn Sur. 2. Dry. TD 1,212 ft.

Callahan County: Alexson, Carlson and Ab-Tex Drilling Co. 1 Hughes, Sec. 18, D&DA Sur. Dry. TD 4,115 ft.

Johnson & Warren 1 Cutbirth, Victoria CSL Sur. 212. Dry. TD 1,903 ft.

Slick Moorman Oil Co. et al 1 Griggs, Sec. 3, T&NO Sur. Dry. TD 2,550 ft.

Turner, West & Honea 1 Holley, E. Swearagner Sur. 763. Dry. TD 1,995 ft.

Coleman County: Guy E. Chapman 1 Smith, 19-1-GH&H, 1 mile N Valera. IP 64 BOPD, 24/64-in., TP 110 psi., 41°, GOR 1,080 cu. ft., Gardner sand 2,899-2,902 ft. TD 2,957 ft.

R. G. Gouch 1 Stewardson, Robert Wilson Sur. 334. Dry. TD 1,800 ft.

A. V. Grant 1 Burns, Asa Wickson Sur. 168. Dry. TD 1,670 ft.

Kewanee Oil Co. 1 Coker, T. B. Frizzell Sur. 711. Dry. TD 2,996 ft.

Moore & Moore Drilling Co. 1 Parker, Hiram Keagans Sur. Dry. TD 3,912 ft.

Woodson Production Co. 1 Henderson, Richard Perry Sur. Dry. TD 1,240 ft.

Eastland County: Texas Pacific Coal & Oil Co. 2 Allen, Wm. Fields Sur. Dry. TD 3,865 ft. Elev. 1,450 ft., Ellenburger 3,735 ft.

Texas Pacific 3-D Allen, B. Danzey Sur. Dry. TD 2,648 ft.

Fisher County: Texas Crude Oil Co. 1-A Huddleston, 10-K-T&P. Dry. TD 6,420 ft., Elev. 1,969 ft., Strawn 5,500 ft., Cambrian sand 6,350 ft.

Jones County: H. Bryan Poff 1 Jones, G. A. Kirkland Sur. Dry. TD 2,970 ft.

Nolan County: Sam Lett 1 Fisher, 40-23-T&P. Dry. TD 7,115 ft. Elev. 2,366 ft., Ellenburger 7,060 ft.

Moore & Moore Drilling Co. 1 Lee, 282-64-H&TC. Dry. TD 6,627 ft.

Skelly Oil Co. 1-C TXL, 63-X-T&P. Dry. TD 6,773 ft.

Shackelford County: Fletcher Oil & Gas Corp. 1 Dyer, 93-12-T&P. Dry. TD 4,050 ft.

Sid Katz Exploration Co. 1 Elliott, Sec. 49, BAL Sur. Dry. TD 4,404 ft.

Stephens County: Woodson Oil Co. 1 Robertson, Jacob Aaron Sur., A-5. Dry. TD 4,480 ft.

Stonewall County: Southern Minerals Corp. and S. C. Herring 1 Percy Jones estate, 19-A-Arnold & Barrett Sur. Dry. TD 6,642 ft. Elev. 1,691 ft., Ellenburger 6,432 ft.

Texas Pacific Coal & Oil Co. 2 Evans, 102-D-H&TC. Dry. TD 6,574 ft.

Throckmorton County: Howsley & Jacobs 1 Matthews, 230-10-ETRR. Dry. TD 1,570 ft.

NORTH TEXAS

Arthur County: M. W. Blair 1 Powell, H. A. Allen Sur., A-3. Dry. TD 1,332 ft.

Blair 1 Wilson, SPRR Sur., A-1070. Dry. TD 1,618 ft.

Consolidated Oil Co. 1-H Prideaux, H. Pearce Sur., A-340. IPP 18 BOPD, 42°, GOR 640 cu. ft., pay 3,927 ft. TD 3,975 ft.

Fortex Oil Co. 1 Cowan & McKinney Sec. 169, J. W. Cain Sur., A-69. Dry. TD 1,508 ft.

Bill Lisle 1 Barnett, Blk. 6, L. M. Meade Subd. Dry. TD 1,449 ft.

F. J. Pounds 1 Hasson, Blk. 102, J. W. Harris Subd. Dry. TD 1,532 ft.

Carleton D. Speed 1-B Perkins, Sec. 47, Bell CSL Sur. Dry. TD 1,810 ft.

Carleton D. Speed 1-J Perkins, Blk. 48, Bell CSL. Dry. TD 1,486 ft.

Clay County: A. B. Harmonson 1 Dunn, Blk. 137, Byers Bros. Subd. Dry. TD 2,140 ft.

Glenn Myers 1 Sanders, D. Nunner Sur., A-366. Dry. TD 1,807 ft.

Cooke County: Howell, Holloway & Howell 1 Cornelius, H. Bloomfield Sur., A-35. Dry. TD 3,721 ft.

The Texas Co. 1 Hellman, D. H. Campbell Sur., A-196. IPP 14 BOPD, pay 1,580 ft. TD 1,907 ft.

Denton County: Coke L. Gage 1 Higgins, J. A. Clayton Sur., A-221. Dry. TD 2,473 ft.

Grayson County: Tom B. Medders 1 Pelphrey, J. Williams Sur., A-1302. Dry. TD 5,565 ft.

Hardeman County: Texas Crude Oil Co. 1 Berry, 58-16-H&TC. Dry. TD 7,670 ft. Elev. 1,407 ft., Strawn 5,685 ft., Canyon 6,450 ft.

Jack County: Warren Petroleum Corp. 1 Worthington, G. Cope Sur., A-130. Dry. TD 3,615 ft.

Montague County: Arnold Bruner 1 Shields, A. Lewis Sur., A-420. IP 126 BOPD, 14/64-in., 40°, Strawn 4,891 ft. GOR 200 cu. ft., TP 275 psi. TD 5,900 ft.

Edwin L. Cox 1 Minor, C. C. Milns Sur., A-485. Dry. TD 1,136 ft.

Wichita County: Jack Dennison 1 Cooper, Waggoner Subd. 217, A-92. IPP 25 BOPD, Cisco 1,300 ft. TD 1,306 ft.

W. H. Hammon 1 Kinnard, Blk. 40, K&N Subd., Cherokee CSL. Dry. TD 4,551 ft.

Saxet Oil Co. 1 Curry, eSc. 33, H&GN. Dry. TD 834 ft.

Harry Snebold 1 Birk, Blk. 15, G. W. Childers Sur. Dry. TD 4,200 ft.

Frank Wood 1 Waggoner "easy," GC&SF Sur., Sec. 1. Dry. TD 2,207 ft.

Frank Wood 1 Waggoner "Free," DI&C Sur., A-641. Dry. TD 2,055 ft.

Wilbarger County: F. J. Pounds 2-L Pounds-Waggoner, 14-13-H&TC. Dry. TD 2,010 ft.

Wise County: Christie, Mitchell & Mitchell 1 Burns, 36-A641-M. Milner Sur. IP 2,740,000 cu. ft. gas, plus 25 bbl. distillate per 1,000,000 cu. ft., 28/64-in., TP 627 psi. TD 6,072 ft.

Christie, Mitchell & Mitchell 1 Hughes-Gadberry Unit, M. Brown Sur., A-40. IP 2,435,000 cu. ft. gas, plus 26 bbl. distillate per 1,000,000 cu. ft., 10/64-in., TP 1,265 psi. TD 6,052 ft.

Young County: Larson & Thomas and Barron Kidd 1 Deats, J. W. Terrell Sur., A-98. Dry. TD 2,139 ft.

L. L. Wainwright 1 J. T. Hutchings, TE&L Sur. 2, A-479. Dry. TD 1,041 ft.

Panhandle Oil Corp. 3 Sidney Hunt, Sec. 178, TE&L Sur. Dry. TD 4,387 ft. Caddo 4,258 ft.

WEST TEXAS

Coke County: A. G. Hill 1 Lee Ligon, 458-1A-H&TC. Dry. TD 4,200 ft.

Harlan Ray & Dave Harris 1 Reaves, T&P Sur. 2. Dry. TD 6,712 ft.

Crockett County: Bob Brosn 1-B University, 25-30-University Lands. IPP 7½ BOPD, 29°, pay 1,326 ft. TD 1,346 ft.

J. W. Gaddy 1-A Gaddy-Shannon, 33-1-GC&SF. Dry. TD 2,365 ft.

Humble Oil & Refining Co. 1-X University, 7-31-University Lands. Dry. TD 9,748 ft. Elev. 2,317 ft., Ellenburger 9,186 ft.

Ector County: Fred W. Shield 1 Henderson, 45-43-T2S-T&P. Dry. TD 4,355 ft.

Gaines County: Hanley Co. 1-A Dunbar, 4-A28-PSL. IP 243 BOPD, plus 5 per cent water, 31°, TY 325-50 psi., GOR 959 cu. ft., pay 4,342 ft. TD 4,395 ft.

Garza County: R. S. Anderson 1 Connell estate, 9-5-GH&H. IPP 23 BOPD, 37°, pay 2,620 ft. TD 2,750 ft.

Blanco Oil Co. et al 1-B Swenson, 53-2-H&GN. Dry. TD 7,148 ft. Elev. 2,400 ft., Pennsylvanian 7,020 ft.

Howard County: Paul DeCleva 1 O'Daniel, 20-30-T1S-T&P. IPP 85 BOPD, 31°, pay 2,760 ft. TD 3,046 ft.

M. A. Machris 13-28 Brown, 28-33-T&P.

One-Man Counterbalancing balances pumping budgets

Increase your pumping performance . . . reduce your pumping costs . . . with the fast, accurate counterbalancing of EMSCO Pumping Units.

One man, working at ground level, can safely and accurately counterbalance an EMSCO unit due to EMSCO's patented rotary counterweights.

These time-saving, wing-type EMSCO counterweights are pivoted from the crank arms and move on semi-circular tracks. All loading is carried from a pivot point and not on the track face, permitting the counterweights to move freely. Thus, any desired counterbalance effect may be obtained quickly . . . easily . . . accurately.

Other quality features: 1) Controlled splash lubrication of gears and gear box shaft bearings. 2) Rigid, one-piece gear box. 3) New improved gear reducer. 4) Roller bearings throughout.

Call CONTINENTAL for EMSCO Pumping Units. There's a type and size to meet every pumping requirement.

CONTINENTAL

Serving the Oil and Gas Industries

THE CONTINENTAL SUPPLY COMPANY
General Offices: Dallas, Texas
Representatives in all principal oil fields of the world

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Garland, Tex. LOS ANGELES, CALIF. Houston, Tex.

D+B balls and seats form a perfect seal

D+B sub-surface pumps are equipped with balls and seats that are individually lapped-in .... forming the tightest seal possible. Each ball and seat is precision-lapped by a special machine perfected by D+B. Sealing faces of every seat are perfectly parallel with each other to assure a positive seal with the cage and seat retainer or bushing.

Simplex and Superloy balls and seats, available in both flat and rib types, are made of high-grade stainless steel and are heat-treated for use under severe pumping conditions. Endurall balls and seats, available in flat type only, are non-magnetic alloy containing chromium and tungsten carbides for use where high corrosion and abrasion resistant properties are needed.

D+B pumps also are equipped with improved closed cages ... with greater strength ... and with greater fluid passage through the cage than through the seat. Faster seating is attained. Due to the center hole in the ball bumper, the ball receives a full fluid load and seats with less spinning and chatter.

For greater pumping efficiency and lower production costs, specify D+B pumps. They are available in a full range of sizes and lengths, and with any desired combination of fittings. Call your nearest D+B or CONTINENTAL store for service anywhere ... anytime!

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EMSCO MANUFACTURING COMPANY
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- DEEP WELL PUMPS
- SUCKER RODS
- COUPLINGS

CONTINENTAL
Serving the Oil and Gas Industries

THE CONTINENTAL SUPPLY COMPANY
General Offices: Dallas, Texas
Representatives in all principal oil fields of the world

E-1078-54

WILDCAT COMPLETIONS

Dry. TD 9,000 ft. Elev. 2,590 ft., Pennsylvanian 8,965 ft.

Kimble County: Barron Kidd & Cherry Bros. 1 Johnson, Sec. 93, M. A. Kadle Sur. IP 10 BOPD, 19°, pay 1,075 ft. TD 1,127 ft.

Lamb County: Sharples Oil Corp. 1 Heard, 8-672-Abner Taylor Sur. Dry. TD 4,230 ft.

Lynn County: Jas. G. Brown & Associates 1 Voight, 14-J-GWT&P. Dry. TD 4,100 ft.

Martin County: Fran Drilling Co. 1-D Glass, 23-38-T1N-T&P. IP BOPD, ½-in., 48°, GOR 475 cu. ft., Pennsylvanian pay 10,474 ft. TD 10,570 ft.

Stanolind Oil & Gas Co. 2 Cowden, 7-39-T1N-T&P. Dry. TD 4,955 ft.

Midland County: Magnolia Petroleum Co. 1 Oldham, 38-37-T1S-T&P. Dry. TD 11,289 ft.

Mitchell County: Russell Maguire 1 Erwin, 3-25-H&TC. Dry. TD 7,820 ft. Elev. 2,300 ft., Canyon lime 7,543 ft.

Pecos County: G. D. Putnam & Co. 1-A Woodward, 32-11-H&GN. IPP 52 BOPD, 33°, pay 2,904 ft., TD 2,949 ft.

Runnels County: Sojourner Drilling Co. 1-A Billups, Sec. 56, H. E. Baldridge Sur. Dry. TD 4,253 ft.

Heep Oil Corp. 1 Gray, H. N. Baggs Sur. Dry. TD 5,051 ft.

Scurry County: Woodson Oil Co. 1 Marley, 600-97-H&TC. Dry. TD 8,345 ft. Elev. 2,829 ft., Strawn 7,877 ft., Mississippian 8,290 ft.

Sterling County: Bay Petroleum Corp. 1-A Foster, 28-22-H&TC. IPP 28 BOPD, 30°, pay 2,211 ft. TD 2,216 ft.

Tom Green County: Echols Bros. 2-B Isaac Funk, 30-5-H&TC. IPP 12½ BOPD, 34°, pay 855 ft. TD 858 ft.

Liedtke & Liedtke 1 Atkins, 17-20-H&TC. Dry. TD 7,013 ft. Elev. 2,343 ft., Ellenburger 6,924 ft.

Ward County: Gulf Oil Corp. 319 O'Brien, 20-F-G&MMB&A Sur., 1 mile E Wickett. Dry. TD 15,815 ft. Elev. 2,677 ft., Devonian 12,485 ft., Fusselman 12,960 ft., Ellenburger 15,254 ft.

INDIANA

Knox County: Cline & Lambert 1 Bobe, NW NW NE 6-1n-8w. Dry. TD 1,644 ft.

SOUTHEAST NEW MEXICO

Curry County: Cities Service Oil Co. 1 Widner, 17-4n-31e. Dry. TD 7,348 ft. Elev. 4,557 ft., Permian 1,400 ft., Wolfcamp 5,840 ft., Pennsylvanian 6,302 ft., pre-Cambrian 7,268 ft.

Eddy County: Stanolind Oil & Gas Co. 1-AD State, 10-19s-28e. IP 3,900,000 cu. ft. gas, 5 bbl. distillate, open 2-in., Pennsylvanian pay 11,018 ft. TD 13,260 ft.

Lea County: Buffalo Oil Co. 25 Baish, 21-17s-32e. IP 814 BOPD, 9/64-in., 44°, TP 1,100-740 psi., GOR 945 cu. ft. Top Pennsylvanian 9,960 ft., pay 11,616 ft. Elev. 4,069 ft.

ILLINOIS

Clay County: James McCollum et al 1 Lutz-Pax, NW NE SE 34-4n-8e. Dry. TD 3,159 ft.

Gallatin County: C. E. Brehm 2 Wisehart, SW SW NE 27-7s-9e. Dry. TD 2,913 ft.

Marion County: K. M. Bayer 1 Halfacre, SW NE NE 27-1n-4e. Dry. TD 2,983 ft.

Saline County: John Stelle 1 Jones, NE NE SW 20-8s-7e. IPF 342 BOPD, Waltersburg, Paint Creek, Aux Vases 2,864-72, 2,670-83, 2,105-17 ft. TD 2,985 ft. (Discovery well of Eldorado Central pool.)

Washington County: John E. Mulligan 1 Kleeman, SE SE NW 29-1s-2w. Dry. TD 1,634 ft.

MICHIGAN

Livingston County: McClure Oil Co. and Tom Mask 1 Wilson, NE NE SE 7-3n-4e. Dry. TD 1,132 ft. in Dundee.

Mason County: Max Spidel 1 Griffin, SE SE SW 36-18n-17w. Dry. TD 2,300 ft. in Dundee.

Mecosta County: Ace Oil Co. 1 Russell & Corbett, NW NE SE 22-14n-10w. Dry. TD 2,850 ft. in Traverse lime.

Oakland County: Alan S. Gray and Ray Whyte 1 Miller, NE SE SE 30-1n-7e. Dry. TD 4,924 ft. in Trenton.

Oakland County: O. K. West 1 McDonald, NE SW SE 33-1n-8e. Dry. TD 4,667 ft. in Trenton.

Van Buren County: Clapsaddle Drilling Co. 1 Van't Zelfde, SW SW NW 32-4s-14w. Dry. TD 979 ft. in Traverse lime.

Washtenaw County: Ford Henry 1 Wagner, NE SE SE 33-4s-4e. Dry. TD 1,020 ft. in Traverse lime.

WEST VIRGINIA

Summers County, Jumping Branch district: United Fuel Gas Co. 1-6788 J. Sanford Lilly, elevation 2,613 ft. Dry. Big lime 2,513-3,455 ft., Berea sand 4,014-4,030 ft., Corniferous lime 7,880-7,943 ft., Healing Springs 8,00-8,047 ft., Clifton Forge 8,121-8,180 ft., TD 8,185 ft.

Cabell County, McComas district: West Virginia Gas Corp. 5-576 Gill-Porter, elevation 603 ft. Dry. Corniferous lime 3,357 ft., Oriskany sand 3,482-3,542 ft., show gas 3,420 and 3,540 ft., Big Six 4,164-4,190 ft., Clinton sand 4,558-4,577 ft., Red Medina 4,670-4,775 ft., TD 4,790 ft.

MISSISSIPPI

Adams County: Lyle Cashion and D. Gammil 1 Henderson et al, 30-8n-2w. Dry. TD 6,018 ft. Elev. 288 ft., Wilcox 3,935 ft., base Baker shale 5,730 ft.

Lamar County: Marshall R. Young and Chicago Corp. 1 Phoenix, 25-1n-16w. Dry. TD 9,616 ft. Elev. 370 ft., lower Tuscaloosa 9,223 ft.

SOUTH LOUISIANA

Avoyelles Parish: E. C. Wentworth 1 Edwards, 31-3n-4e. Dry. TD 7,628 ft.

Iberia Parish: San Juan Exploration Co. and Algord Oil Co. 1 Patout & Olivier, 8-13s-7e. Dry. TD 7,502 ft.

Sun Oil Co. 1 Lietemeyer, 38-12s-7e. Dry. TD 13,186 ft.

Jefferson Davis Parish: Richardson & Bass 1 Barnes, 17-9s-6w. IP 189.46 BOPD, 7/64-in., 51.7°, perforations 10,368-74 ft. TD 11,490 ft. (Extends Iowa field.)

St. James Parish: Union Oil Co. 1 Karstein, 41-13s-16e. IP 200 BOPD, 9/64-in., 30°, perforations 10,922-44 ft. TD 11,300 ft. (New field.)

St. Landry Parish: Hassie Hunt trust 1 Riseman et al, 27-7s-6e. Dry. TD 10,664 ft.

St. Mary Parish: Fred Simmons 1 Sterling Sugara, 42-14s-10e. Dry. TD 7,700 ft.

Southern Natural Gas Co. 1 Perry, 38-15s-9e. IP 164 BOPD, 12/64-in., 36.1°, perforations 10,209-12 ft. TD 12,031 ft. (New pay in Franklin field.)

NORTH LOUISIANA

DeSoto Parish: Joe W. Brown 1 Harris et al,

(Continued on page 166)

This advertisement is neither an offer to sell nor a solicitation of offers to buy any of these securities. The offering is made only by the Prospectus.

May 27, 1954

170,000 Shares

FRITZ W. GLITSCH & SONS, INC.

COMMON STOCK

(Par Value $2 per share)

These shares are issued and outstanding and are being purchased from certain stockholders, by the underwriters.

Price $11.50 per share

Copies of the Prospectus may be obtained from any of the several underwriters, including the undersigned, only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may be legally distributed.

A. C. Allyn and Company
INCORPORATED

First Southwest Company

His testing makes CHASE® Antimonial Admiralty Heat Exchanger Tubes the *best you can buy!*

TOUGH is the word for the Chase Expansion Test pictured above. A pin with a 1½" per ft. taper is driven into the end of a Chase Heat Exchanger Tube which must withstand an increase of *20% in diameter.*

This test is just one of many that Chase Tubes must pass.

Chase *ANTIMONIAL ADMIRALTY* Tubes must pass far sterner tests in the Chase Laboratories than they will ever encounter under normal tube usage. That's why they last for years in actual use. It pays to insist on Chase.

CHASE WAREHOUSE STOCKS: Houston,* Los Angeles, New Orleans, Tulsa**

*Handled by Standard Brass & Mfg. Co.
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Boston	Dallas	Indianapolis	Minneapolis	Philadelphia	St. Louis	(†sales office only)

PERSONALS

Kenney Steps Up

Builder of African refinery Stanvac board member

BRYANT F. KENNEY, new member of the board of directors of Standard Vacuum Oil Co., earned this accolade by directing the planning and building of the first petroleum refinery to be erected in South Africa.

The 17,300-bbl. refinery at Durban was built by a subsidiary of Stanvac, Standard-Vacuum Refining Co., of South Africa, Pty., Ltd., and went on stream in May.

Young, as directors go, Kenney at 44 has been associated with refining with Standard Oil Co. (N. J.) for nearly 25 years. A graduate of Massachusetts Institute of Technology in 1930 with a B.S. degree in mechanical engineering, he joined Esso at the Bayway, N. J., refinery.

By the time World War II appeared imminent Kenney was capable of handling most of the details necessary to keep the huge Bayway plant running at capacity. The United States Navy recognized Kenney's ability and placed him in charge of distributing products from the largest refinery on the Atlantic Coast to its petroleum pool in New York area.

After the war Kenney became assistant administrative head at Bayway and in this position coordinated all the technical and mechanical features of the refinery, which then employed more than 4,000 persons and charged 135,000 bbl. of crude daily.

While in this assignment, he acquired a sound knowledge of supply, labor, economic, and other problems involved in refining.

In January 1951, Kenney joined Stanvac and was sent to Durban to build its refinery where none had existed before. Now that he's finished the native Iowan is Stateside again and ready to tackle domestic problems.

James R. Nolan, petroleum engineer with The California Co., has been transferred from Rangely, Colo., to Denver.

Elmore R. Torn has been named assistant to the vice president and general counsel of Transcontinental Gas Pipe Line Corp.

Ben W. Smith has been promoted by Continental Oil Co. from party chief to geophysical supervisor at Oklahoma City, succeeding **Graham Fenner,** who was moved to Ardmore in a similar position.

George C. Sheahan has been elected a director and vice president of Sunset Oil Co., Los Angeles, and executive vice president and general manager of United Petroleum Corp. of Portland, Ore. United Petroleum was bought recently by Sunset from Sheahan and his associates.

Jan G. Schaafsma has been promoted to the post of assistant manager for General Petroleum Corp.'s laboratories department. Schaafsma, who joined General Petroleum in 1934, has been in laboratory work since that time.

Frank Fisk has been appointed head of the Oil and Gas Evaluation Division of Garrett & Co. During World War II, Fisk was a lieutenant commander with the U. S. Navy at Point Barrow, Alaska, in charge of exploration activity in Naval Reserve No. 4. Fisk's most recent work was in Cuba where he did the geology and recommended the location of the 250-bbl. per day discovery there.

John Souder has been appointed manager of the new Esso Engineering Department of Standard Oil Development Co. Souder has been with Standard Development since 1929 including 14 years at Aruba refinery where he was head of the aviation gasoline facilities.

John V. Chambers, who was administrative manager for Bechtel Corp. on the Lakehead Pipe Line extension project, has been appointed assistant to **M. C. McGough,** vice president of Bechtel's eastern division.

Richard P. Shuck has been named supervisor of oil movements for Ohio Oil Co. Shuck joined the company in 1930 and since 1950 has been chief of the pipeline accounting department.

Stanley B. Crooks, superintendent of sales and traffic for Cities Service Oil Co.'s gasoline-chemical division, has been awarded the distinguished service medal of the Natural Gasoline Association of America. The medal recognizes Crooks' contribution to the industry in the field of traffic, technical, and statistical studies.

J. H. Galloway has been promoted by Humble Oil & Refining Co. to assistant manager in the production department. He was formerly assistant superintendent of the West Texas production division. **L. H. Byrd,** who has been production superintendent for Humble in California, will succeed Galloway.

James W. Nance has resigned as chief geologist of Pioneer Oil Corp. to go into consulting work in Denver. Nance was with Standard Oil Co. (N. J.), from 1934 to 1942. After serving 4 years in the Navy he joined Carter Oil Co. in 1946 and was a geologist in the Rocky Mountain area until 1951, when he joined Pioneer.

Dr. K. A. West, production superintendent at the Canadian Oil Companies, Ltd., refinery at Sarnia, has been appointed assistant manager of manufacturing. **C. H. Tew,** formerly head of the costs and economics department for Canadian, is now manager of supply and transportation with headquarters at Toronto.

R. C. Grisham, Abilene, Tex., has been elected president of Grisham-Hunter Oil Corp., filling the post held by Thomas Franklin Grisham until his death March 6. Other new officers are: **M. A. Grisham,** executive vice president; **J. W. Butler,** vice president; and **F. L. Akers,** assistant to the executive

PERSONALS

The newly formed Petroleum Industry Committee of the American Institute of Electrical Engineers has selected September 27 through 29 as the dates for its first technical conference. While Tulsa will be host for the first conference, the committee plans to rotate the convention site among other southwestern cities. Members of the committee are: (seated left to right) W. F. Hilderbrand, General Electric Co., Tulsa; J. H. Heller, Public Service Co., Tulsa; G. R. VanBerkleo, Public Service Co., Tulsa; W. H. Stueve, consulting engineer, Oklahoma City; and R. S. Gardner, assistant secretary of A.I.E.E. headquarters. Standing are R. D. Bennett, Southwestern Bell Telephone Co., Tulsa; Prof. David L. Johnson, Oklahoma A. & M. student branch counselor; J. D. Wells, Public Service Co., Tulsa; Roy J. Thompson, Carnahan & Thompson, Oklahoma City; V. J. Sittel, Service Pipe Line Co., Tulsa; M. C. Callihan, Gulf Refining Co., Tulsa; H. M. Furtney, John W. Elder Co., Tulsa; and Dale H. Watt, Watt Plumbing, Air Conditioning & Electric Co., Tulsa.

vice president. **Harold Y. McClure** has joined the firm as geologist in the Midland, Tex., office.

H. C. Behrens has joined Dow Chemical Co.'s Texas division as a design engineer in the instrument department.

C. B. Lester, chief engineer of Mid-Valley Pipeline Co., Longview, Tex., has accepted special assignment in Paris, France for the Department of the Army. Lester will serve as consultant for the Joint Construction Agency of the U. S. European Command on problems involving pipelines, tank farms, and allied installations.

Robert L. Martin has been promoted by Shell Oil Co. to production laboratory supervisor at Denver, Colo. Martin formerly was exploitation engineer at Sterling, Colo., for Shell.

J. T. Murff, civil engineer with Humble Oil & Refining Co., has been made district civil engineer of the company's Sugar Valley district, Gulf Coast division.

Roscoe Clark, supervisor of engineering research for Continental Oil Co. at Ponca City, Okla., has joined Western Co., at Midland, Tex., as coordinator of research in acidizing, fracturing, perforating, and radioactivity well logging.

Jack F. Harang has been named division manager of Republic Natural Gas Co.'s exploratory offices in New Orleans. Harang, a former professor at Tulane University, has recently been chief geologist and geophysicist for the estate of William Helis.

Ralph S. Cooley, until recently in charge of exploration for Joseph I. O'Niell, Jr., Midland independent, and **E. H. Holcomb,** formerly head of engineering, land, and geological work for George P. Livermore, Inc., Lubbock, Tex., have opened offices in Midland as petroleum consultants.

Emil E. Ebner, Dr. Carl Georgi, and **Clinton G. Johnson** have been elected to the board of directors of Quaker State Oil Refining Corp. Ebner, who joined the company in 1928, is general superintendent of refineries. Georgi is vice president and director of research of Enterprise Oil Co., Inc., a subsidiary of Quaker State. Johnson, a veteran of 35 years with Quaker State, is treasurer and assistant secretary.

C. E. (Ed) Siberts, independent geologist at Evansville, Ind., is transferring his offices to Okmulgee, Okla.

James P. Baldridge has been transferred from Hobbs, N. M., to Snyder, Tex., as assistant district superintendent.

O. C. Bailey, chairman of the Arkansas Oil and Gas Commission, will receive an honorary degree from the University of Arkansas at the school's commencement June 5.

Jim R. Ramsey, formerly with Stanolind Oil & Gas Co., has opened petroleum consultant offices in Oklahoma City.

Dr. Ed Bloesch, Tulsa consulting geologist, and **Dr. James H. Gardner,** president of Gardner Petroleum Co., have been presented honorary memberships in the Tulsa Geological Society.

J. E. Gallagher has been named chief engineer for Shell Oil Co.'s Pacific Coast exploration and production area. Gallagher joined Shell in the late 1930's while he was still a student at Stanford and since then has worked in the Rocky Mountains and in various positions on the West Coast.

Joseph S. Bowman, formerly with Union Sulphur & Oil Corp., has been named vice president of Colorado Oil & Gas Co., in Denver. **J. Ralph Coleman,** who recently joined the firm, has been named coordinator of Gulf Coast operations.

H. S. Hicks, formerly manager of catalytic cracking at the Wilmington, Calif., refinery of Shell Oil Co., is temporarily stationed in the company's San Francisco office before moving to Anacortes, Wash., as assistant project manager for the refinery Shell is building there. **L. A. Smith,** formerly senior engineer at Wilmington, is construction engineer for the project. **R. A. Tubman** has been shifted from manager of thermal cracking into Hicks' former job, and **F. S. Hummel** has been named Tubman's successor. **S. G. Abbott,** formerly in the engineering department at Shell's Martinez refinery, also has joined the San Francisco group working on the new refinery.

PERSONALS

Robert Lowe has joined the staff of Herman & George R. Brown as a geologist.

R. Paul Henry has been elected treasurer and assistant secretary of Mid-Continent Petroleum Co. succeeding **Charles Klein,** who has retired.

Thomas M. West has joined Warren-Bradshaw Exploration Co. as division manager of the firm's new Midland, Tex., office which is being moved from Abilene, Tex. West, a graduate of the University of North Carolina, was with Magnolia Petroleum Co. for 8 years before joining Moore Exploration Co. 2 years ago.

Bruce Jones, manager of Panhandle Oil Corp.'s refinery at Wichita Falls, Tex., has been named a vice president of the company. Jones has been with Panhandle 2 years.

William J. John has joined Texas Crude Co., Fort Worth, as chief geologist. John formerly was with British-American Oil Producing Co. in Fort Worth.

I. C. (Cleve) Huff, Jr., assistant executive manager of the Independent Petroleum Association of America, has

I. C. HUFF, JR.

C. E. BUCHNER

been appointed executive manager of the organization succeeding **C. E. Buchner,** who has retired effective June 1. Huff first joined I.P.A.A. in 1941 as field representative in Tulsa and later served as district representative in Houston. He returned to Tulsa as membership director in 1950 and was named assistant executive manager in 1952. Buchner joined the I.P.A.A. in 1931 and has played a major part in building the organization from a small group of independent oil men to a nationwide organization with membership in every oil producing area.

J. L. Sleeper, Jr., has been promoted by The Texas Co. from geologist in the Fort Worth office to district geologist in the West Texas division of the production department at Midland.

J. G. Davis, II, petroleum engineer with Continental Oil Co. at Linen, Wyo., has been appointed associate research engineer in the company's Ponca City offices.

Everett H. Tollefson, president of Hope Natural Gas Co., has been elected a director of the company's parent concern, Consolidated Natural Gas Co.

J. C. Conner has been named division gas superintendent for the Texas-New Mexico division of Stanolind Oil & Gas Co. Conner succeeds **D. W. Farnham,** who has been transferred to Brownsville, Tex., as synthesis-plant superintendent in Stanolind's chemical operations section.

H. T. Morley, chief geologist for Stanolind Oil & Gas Co., has been elected president of the Tulsa Geological Society. Other officers named are: **E. T. Benson,** Service Pipe Line Co., first vice president; **R. J. Lantz,** Union Oil Co. of California, second vice president; **D. L. Norling,** Anchor Petroleum Co., secretary - treasurer; and **C. A. Weintz,** Stanolind Oil & Gas Co., business manager.

T. B. Slick, Jr., has been named a director of Bailey Selburn Oil & Gas, Ltd., of Calgary.

Frank M. Ritchie has been elected vice president of the Louisiana Land & Exploration Co.

Charles M. Chapman has been appointed division manager at Casper, Wyo., for Mohawk Petroleum Co.

Bruce Jones has been elected vice president of Panhandle Oil Corp. Jones, who joined the firm in 1952, will continue to serve as manager of the company's refinery at Wichita Falls, Tex.

D. F. Detrick, geologist for Shell Oil Co., has been transferred from Long Beach to the area offices in Los Angeles. Two other changes in the area exploration department are **J. T. Dunlap,** geologist, moved from Ventura to Ely, Nev., and **R. D. Mathews,** geologist, transferred from Grand Junction, Colo., to Salt Lake City.

Phil D. Larson, formerly assistant division geologist at Fort Worth for Cities Service Oil Co., has joined Ralph Lowe and Lowe Petroleum Co. at Fort Worth as head of the geological department. Larson served as district geologist for Cities Service at Wichita Falls and Midland, Tex., before becoming assistant division geologist in 1952.

DEATHS

John Francis Bohns, 60, production superintendent for General Petroleum Corp., died recently in a Bakersfield, Calif., hospital.

Ira R. Corn, partner in Pickard-Corn Oil Co., died in Los Angeles recently. Corn has been active in the Long Beach oil field for years.

Herbert L. Biery, 86, died May 17 in Franklin, Pa. Biery had spent 71 years in the oil business in Pennsylvania, most of it in Venango County.

William A. Jacobson, 69, Houston, died in Fort Worth May 18 while on a business trip. A pioneer in the oil business, he formerly was superintendent of transportation for Cortez-Atlantic Oil Co., Tampico, Mexico, and in the latter 1920's he went into business as an independent drilling contractor in Mexico.

Cyrus C. Robbins, 57, petroleum engineer for Sunray Oil Corp., died May 21 in Tulsa following a heart attack. Robbins had been with Sunray since 1942.

Emmert G. Surber, 56, superintendent of the General Petroleum Corp. refinery at Torrance, died recently. Surber had been with the company's refining department for 31 years.

Steele Bruce White, 52, owner of Steele Bruce White Oil Co. of Ardmore, Okla., was killed May 23 in an automobile crash 9 miles northeast of Pawhuska, Okla.

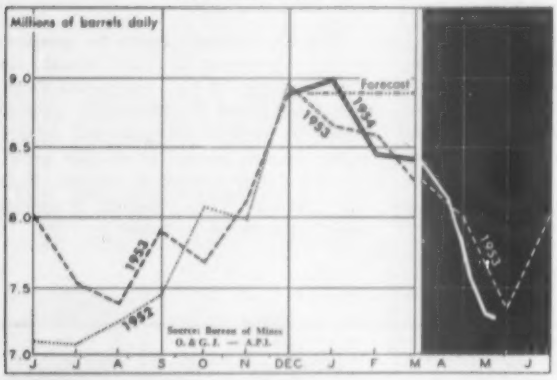
Ralph Mitchell, 71, pioneer oil producer and former land man for Marland Oil Co., died at his home in Tulsa recently. Born in the Bahama Islands, he was one of the first operators in Oklahoma's Chelsea field.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,449,450	UP	23,700	UP	51,450
Crude stocks	273,924,000	UP	921,000	UP	2,924,000
Completions	1,072	UP	10	UP	89
Refinery runs	6,969,000	DOWN	51,000	DOWN	14,000
Gasoline stocks	174,552,000	DOWN	1,198,000	UP	22,149,000
Four-product stocks	310,910,000	UP	3,043,000	UP	29,099,000
Total imports	1,102,100	UP	272,400	UP	10,600

TOTAL DEMAND—ALL OILS



Mid-Continent Refiners Lose Part Of Resid Market to Rocky Mountain

INCREASED movement of residual fuel into the industrial areas of the North Central states from refineries in the Rocky Mountain district has resulted in sharp competition for the high-sulfur residual market in District 2.

Most of the residual shipped out of the Rocky Mountain area has a high sulfur content, and these low-priced fuels have been more difficult to move than the better-quality resids. Since the market for these fuels is limited, keen competition has forced a drop in spot quotations for movement either out of Group 3 refineries or from the Rocky Mountain area.

Cut in railroad use . . . Many of the refiners' problems in marketing residual fuel in Districts 2 and 4 have resulted from the decreased purchases of residual by the railroads. The shift to diesel fuel, combined with a general net decrease in fuel consumption, caused a drop in residual sales to railroads by Rocky Mountain refiners amounting to about 2,285,000 bbl. in 1952. Since residual production in the district decreased only 758,000 bbl. in 1952, suppliers had to find new markets for the remaining 1,527,000 bbl. Current data are not available for railroad use by refining districts, but total railroad consumption of heavy fuel in 1953 was 31 per cent less than in 1952. The total for the first 2 months of this year was 40 per cent less than last year.

Market shifts . . . Transportation statistics indicate that part of the District 4 surplus moved to District 2. There is quite a time lag in the publication of tank-car movement of petroleum products. The latest information available at this time is for the third quarter of 1953. Shipments of heavy fuel from District 4 to District 2 in the 12-month period ended September 30, 1953, showed an increase of 65 per cent over the previous 12-month period.

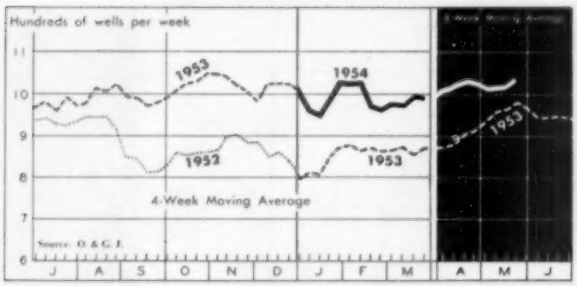
Surplus heavy crudes in California and new refineries in the Pacific Northwest will tend to prevent movement of Rocky Mountain residual to District 5.

Competition for the North Central market has lowered the netback for some Mid-Continent refiners to the point where it is to their advantage to ship residual fuel to the Gulf Coast.

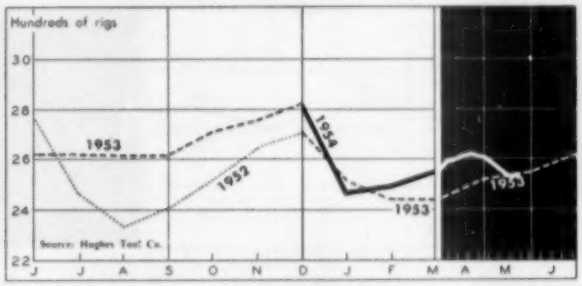
Increased coking . . . The low netback from residual fuel for both Mid-Continent and Rocky Mountain refiners tends to make coking more attractive in these areas. Combined capacities of three coking units to be completed in these districts this year will require about 17,000 bbl. daily of heavy fuel for feed stock.

There has been little change in the low of Group 3 quotations for residual for the past few weeks, but some suppliers report that the tone of the market has improved slightly. Increased shipments of heavy material as road oil and asphalt has tended to hold distress sales to a minimum. Suppliers expect better prices by early fall.

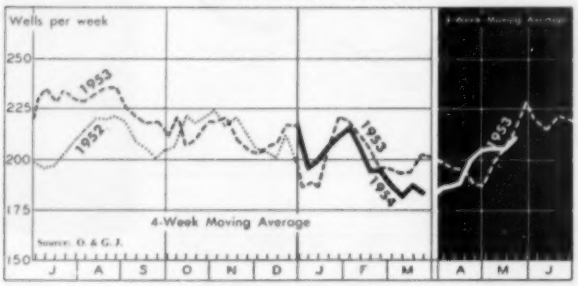
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

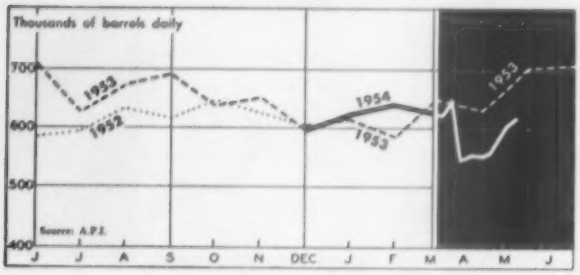
Area—	5-24-54	Change from 5-17-54	Change from 5-25-53
Gulf Coast	557	— 6	—40
N. and W. Texas-New Mexico	779	12	—23
Arkansas-N. Louisiana-E. Texas	177	8	59
Oklahoma	333	18	6
Kansas-S. Nebraska	148	—16	—20
Illinois-Eastern	136	— 6	17
Rocky Mountain	259	7	23
Pacific Coast	140	— 6	—24
Total United States	2,529	11	— 2
Western Canada	111	— 1	—27

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 22, 1954

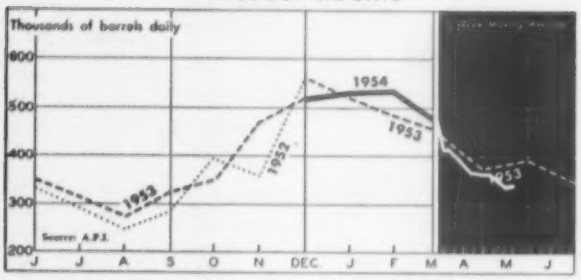
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	0	0	0	0	0	42	52	0	0	0	0	0	2	0	1	35	38
Arkansas	6	2	0	4	27,753	260	184	0	0	0	2	2	12	0	3	40	55
California	63	45	1	17	284,572	987	1,012	3	0	0	12	15	32	1	6	203	242
Colorado	27	6	1	20	156,741	499	199	1	0	0	15	16	14	0	0	180	194
Illinois	53	30	0	23	130,431	1,054	645	1	0	0	4	5	3	0	0	166	169
Indiana	15	6	0	9	24,834	308	462	0	0	0	1	1	4	0	0	69	73
Kansas	86	45	5	36	284,498	1,755	1,943	0	0	0	12	12	30	0	7	228	265
Kentucky	26	15	1	10	42,699	427	404	0	0	0	1	1	8	0	0	45	53
Louisiana	77	49	8	20	545,698	1,290	1,003	3	0	1	8	2	42	20	14	109	185
North	36	24	7	5	123,791	690	410	0	0	1	3	4	5	0	5	41	51
South	41	25	1	15	421,907	600	593	3	0	0	5	8	37	20	9	68	134
Michigan	13	4	0	9	37,853	217	206	0	0	0	7	7	7	0	0	91	98
Mississippi	4	0	0	4	33,411	148	138	0	0	0	2	2	3	0	0	52	55
Montana	3	1	0	2	10,577	109	149	0	0	0	0	0	1	0	0	30	31
Nebraska	9	5	1	3	47,770	132	119	1	0	1	3	5	9	0	1	43	53
New Mexico	15	11	1	3	112,078	421	530	1	0	1	1	3	8	0	5	53	66
North Dakota	6	6	0	0	50,501	92	100	0	0	0	0	0	3	0	0	30	33
Ohio	14	10	1	*3	25,126	434	392	0	0	0	0	0	1	0	2	5	8
Oklahoma	166	104	6	†56	575,755	3,644	2,792	1	0	0	11	12	46	2	9	246	303
Pennsylvania-New York	48	24	4	‡20	83,700	951	913	0	0	1	4	5	0	0	4	14	18
Texas	410	254	17	139	1,784,530	7,113	6,748	21	5	1	102	129	279	33	61	1,641	2,014
Southwest (1 & 4)	51	29	1	21	258,956	1,009	1,083	3	2	0	16	21	30	18	15	283	346
Gulf Coast (2 & 3)	41	23	5	13	268,543	1,053	1,003	3	1	1	10	15	31	10	17	259	317
East (5 & 6)	26	12	2	12	128,809	359	324	1	0	0	10	11	8	0	6	99	113
North Central (7-B & 9)	164	93	0	71	479,802	2,693	2,490	5	2	0	47	54	129	4	8	684	825
West (7-C & 8)	102	77	5	20	558,173	1,630	1,507	9	0	0	17	26	81	0	10	284	375
Panhandle (10)	26	20	4	2	90,247	369	341	0	0	0	2	2	0	1	5	32	38
Utah	0	0	0	0	0	22	29	0	0	0	0	0	2	0	0	13	15
West Virginia	8	0	5	3	30,914	207	225	0	0	0	2	2	0	0	10	7	17
Wyoming	23	15	0	8	141,179	565	235	1	0	0	5	6	21	0	3	74	98
Miscellaneous	0	0	0	0	0	76	22	0	0	0	0	0	1	0	0	10	11
Total United States	**1,072**	632	51	389	4,430,620	20,753	18,502	33	5	5	192	**235**	528	56	126	3,384	4,094
Total previous week	1,062	613	44	405	4,250,692			23	1	4	181	209	495	51	121	3,192	3,859
Total May 23, 7953	983	534	81	368	4,038,991			42	2	8	165	217	548	36	150	3,399	4,133

Service wells included: *1, †10, ‡18.

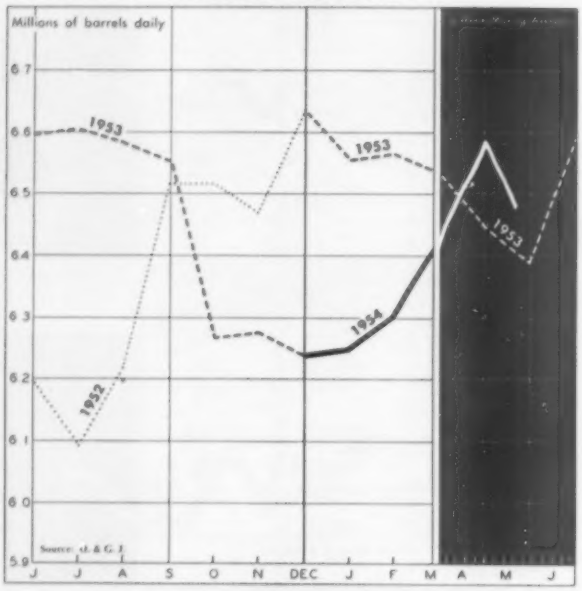
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

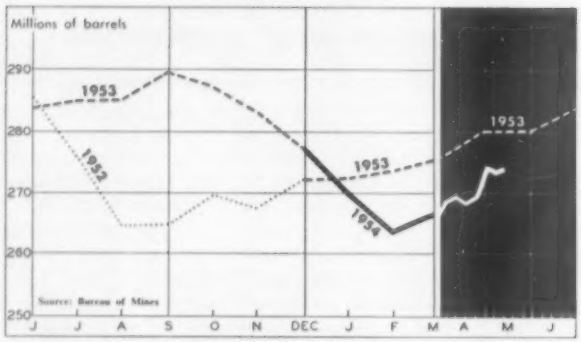


DAILY AVERAGE PRODUCTION FOR WEEK

	May 22			May 15
	Crude oil	Lease condensate	Total	total
Alabama	4,500		4,500	4,800
Arkansas	77,250	550	77,800	77,450
California	990,200		990,200	989,700
Colorado	128,100		128,100	124,000
Dakotas	15,900		15,000	14,400
Eastern	54,500		54,500	54,500
Florida	1,650		1,650	1,650
Illinois	181,200		181,200	183,600
Indiana	31,000		31,000	31,100
Kansas	339,000		339,000	328,600
Kentucky	37,100		37,100	36,200
Louisiana	669,150	44,200	713,350	712,700
North	109,150	3,700	112,850	112,200
South	560,000	40,500	600,500	600,500
Michigan	36,600		36,600	36,000
Missaissippi	88,650	3,450	92,100	92,300
Montana	36,900		36,900	33,200
Nebraska	20,400		20,400	20,400
New Mexico	204,300	1,600	205,900	205,800
Oklahoma	542,200		542,200	536,100
Texas	2,640,000	50,550	2,690,550	2,690,550
Dist. 1	41,500	425	41,925	41,925
Dist. 2	139,000	7,200	146,200	146,200
Dist. 3	416,000	24,250	440,250	440,250
Dist. 4	240,000	6,000	246,000	246,000
Dist. 5	44,000	450	44,450	44,450
Dist. 6	109,000	5,200	114,200	114,200
East Texas field	229,500		229,500	229,500
Dist. 7-B	119,000	50	119,050	119,050
Dist. 7-C	178,000	4,750	182,750	182,750
Dist. 8	856,000	1,700	857,700	857,700
Dist. 9	188,000	500	188,500	188,500
Dist. 10	80,000	25	80,025	80,025
Utah	5,500		5,500	5,400
Wyoming	245,900		245,900	247,300
Total U. S.	6,349,100	100,350	6,449,450	6,425,750
Change from previous week, up			23,700	
Canada	237,825		237,825	143,850
Total U. S. production January 1-May 22			912,512,150 bbl.	
Same period last year (crude plus cond.)			*923,242,435 bbl.	

*Includes 13,298,525 bbl. condensate.

CRUDE-OIL STOCKS



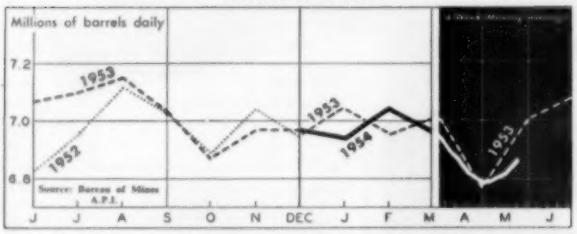
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

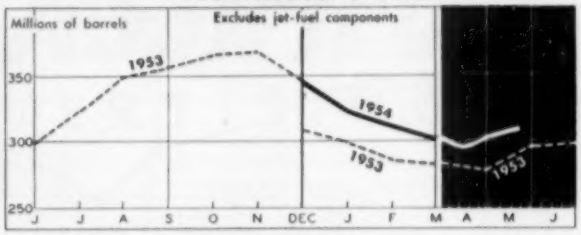
	May 15, '54	May 8, '54	May 16, '53
Pennsylvania Grade	3,194	3,030	2,519
Other Appalachian	1,876	1,989	1,912
Illinois, Indiana, Michigan	11,598	12,302	11,890
Kansas	9,761	9,625	10,452
Oklahoma	27,457	27,466	27,937
Arkansas	3,380	3,204	2,917
Louisiana	16,584	16,238	16,173
North	2,535	2,479	2,899
Gulf	14,049	13,759	13,274
Mississippi	3,420	3,314	4,144
New Mexico	7,163	7,192	7,234
Texas	126,969	125,709	133,787
East Texas proper	11,763	11,672	10,915
West Texas	55,608	54,677	64,471
Texas Gulf	27,141	26,676	25,523
Other Texas	32,457	32,684	32,878
Wyoming	14,249	13,978	12,915
Other Rocky Mountain	4,195	3,854	3,100
California	33,456	33,789	32,193
Foreign	†10,622	11,313	9,675
Total	273,924	273,003	276,848

*Bureau of Mines. †Includes 2,676,000 bbl. in California.

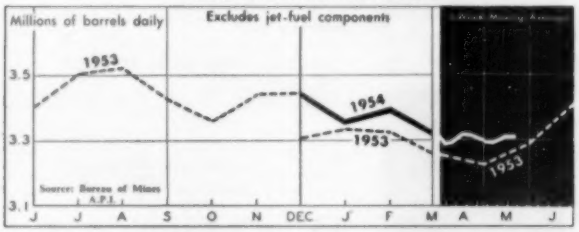
REFINERY RUNS



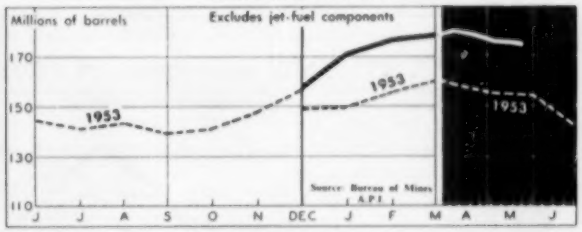
FOUR-PRODUCT STOCKS



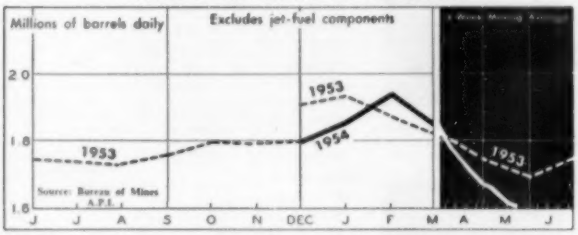
GASOLINE PRODUCTION



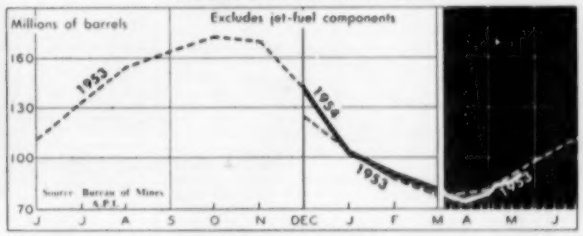
GASOLINE STOCKS



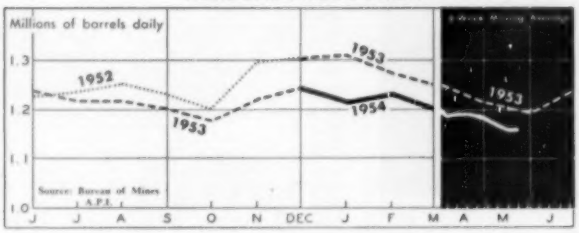
MIDDLE-DISTILLATE PRODUCTION



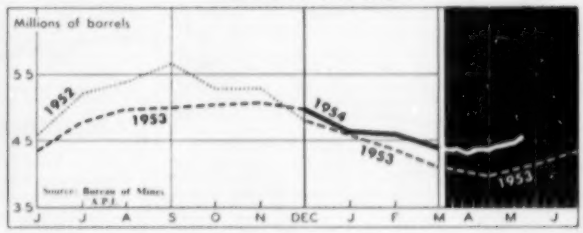
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, MAY 22

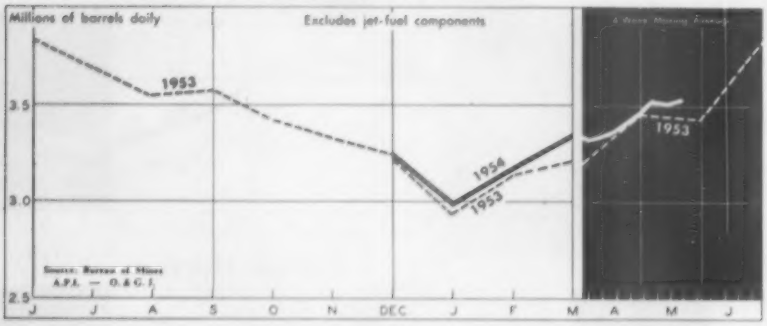
(Excludes all jet-fuel components)

(Thousands of barrels)

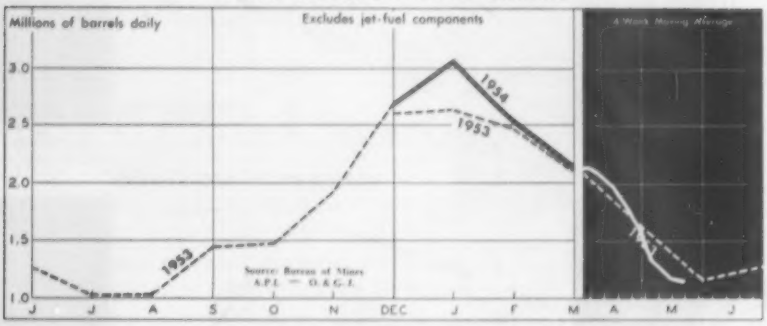
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, May 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,042	417.7	30.1	214.7	210.4	36,654	9,203	22,392	9,202	1,039	413.9	35.6	239.5	223.1
Appalachian:														
District 1	105	51.0	4.0	23.7	11.0	4,655	422	1,237	508	103	39.7	4.9	16.2	14.0
District 2	54	41.9	1.1	7.3	9.4	2,589	366	689	357	95	48.2	3.0	11.3	14.3
Ind., Ill., Ky.	1,285	654.4	68.9	231.0	171.1	38,694	4,608	11,838	4,224	1,229	630.6	68.5	199.1	156.1
Okla., Kans., Mo.	647	350.3	20.0	134.6	41.6	18,400	1,264	7,688	1,269	571	309.1	15.4	128.1	48.9
Inland Texas	238	172.0	12.7	41.1	24.3	7,128	381	1,396	1,357	263	169.5	15.4	41.9	34.4
Texas Gulf Coast	1,638	779.4	76.4	282.2	234.9	22,757	2,894	6,740	4,421	1,707	799.3	100.4	390.2	241.3
La. Gulf Coast	578	273.6	48.1	157.1	48.4	9,200	1,874	3,206	1,117	570	270.1	42.2	133.3	52.8
N. La. and Ark.	88	37.1	8.7	19.9	6.3	4,308	671	908	218	86	32.1	7.9	18.5	7.2
Rocky Mountain:														
New Mexico	20	11.7	1.0	3.0	2.9	203		62	50	17	10.9	0.5	2.1	3.4
Other Rocky Mtn.	233	112.4	4.3	50.0	29.1	8,272	176	1,941	863	238	111.8	3.9	52.4	42.3
California	1,041	434.6	14.7	143.0	390.7	21,692	404	10,232	22,180	1,084	461.6	5.8	154.6	359.6
May 22, 1954	6,969	3,336.1	290.0	1,307.6	1,180.1	174,552	22,263	68,329	45,766	7,002	3,296.8	303.5	1,387.2	1,197.4
May 15, 1954	7,020	3,435.7	288.4	1,279.0	1,162.3	175,750	21,590	65,531	44,996	.....	.....	.....	.....	.....
May 23, 1953	6,983	3,237.1	303.1	1,393.3	1,192.6	152,403	22,003	66,776	40,629	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

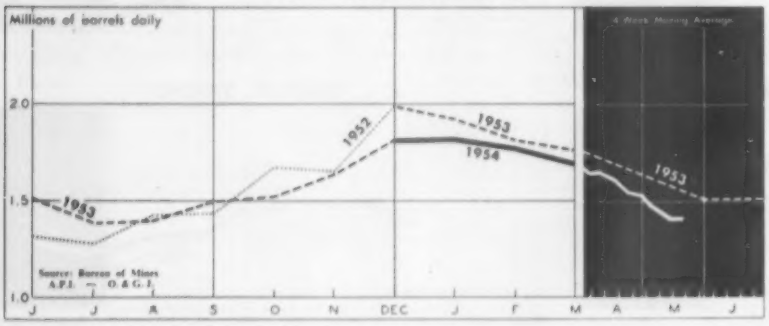
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of May 26, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	11.5-12.25	10.25-10.5
Premium gasoline	11.75-12	13.25-14	11.5-12.0
42-44 w.w. kerosine	9-9.25	9.95	8
No. 2 straw fuel oil	8.125-8.25	8.95	9
No. 6 residual	$1.00-1.10	$2.20-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Movement of residual fuel from refineries in the Rocky Mountain district to industrial areas of the North Central states is furnishing additional competition for Mid-Continent refiners. Some Group 3 material is moving to the Gulf Coast.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 5-22-54	3,308	3,532
February 1954	3,365	3,182
January 1954	3,354	2,985
May 1953	3,297	3,456
Middle distillate:		
Four weeks ended 5-22-54	1,602	1,153
February 1954	1,957	2,417
January 1954	1,857	3,076
May 1953	1,691	1,171
Residual fuel:		
Four weeks ended 5-22-54	1,155	1,405
February 1954	1,241	1,753
January 1954	1,271	1,831
May 1953	1,197	1,510

REVISED WEEKLY PRODUCTION—1953

(Crude and lease condensate)
(Barrels daily)

January 3, 1953	6,583,700
January 10	6,522,900
January 17	6,570,850
January 24	6,543,000
January 31	6,571,950
February 7	6,554,750
February 14	6,573,500
February 21	6,570,050
February 28	6,549,650
March 7	6,537,000
March 14	6,523,000
March 21	6,566,400
March 28	6,568,150
April 4	6,507,450
April 11	6,434,850
April 18	6,445,350
April 25	6,434,400
May 2	6,326,600
May 9	6,379,950
May 16	6,381,800
May 23	6,398,000
May 30	6,394,900
June 6	6,537,450
June 13	6,618,300
June 20	6,609,850
June 27	6,603,400
July 4	6,357,100
July 11	6,584,150
July 18	6,616,500
July 25	6,629,250
August 1	6,623,950
August 8	6,579,750
August 15	6,561,700
August 22	6,601,250
August 29	6,605,850
September 5	6,597,500
September 12	6,574,700
September 19	6,545,800
September 26	6,552,150
October 3	6,461,400
October 10	6,345,950
October 17	6,333,900
October 24	6,044,800
October 31	6,235,800
November 7	6,262,500
November 14	6,274,100
November 21	6,297,900
November 28	6,281,150
December 5	6,200,950
December 12	6,248,600
December 19	6,256,100
December 26	6,262,750

(The schedule of selected crude prices appeared on page 456 of May 24 issue.)

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 20c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$14.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

PIPE. New seamless J55 mill end 5½" and 7" from Pueblo mill. Get our low prices. Pressey & Son, Pueblo, Colorado.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lundquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

FOR SALE: One 180-trace set of reflection seismograph instruments, rack and panel mounted. Very reasonably priced. Texas Seismograph Company, Box 2069, Phone 3-1493, Wichita Falls, Texas.

CARDWELL MODEL S single drum works with WAKU Waukesha, American brake-out cathead, LeBus grooved bar, good condition. $5500. W. C. Fatjo. Phone 5-6137, Lafayette, Louisiana.

BUCYRES-ERIE 22W spudder, trailer-mounted—49 Chevrolet truck—drilling line—sand line—bits—bailers—wrenches complete. All A-1 condition. Thomas Whelan, 712 West 2nd St., Odessa, Texas.

FOR SALE: Model "K" Cardwell single drum well servicing unit, powered by 6-SRK Waukesha. With single pole telescoping mast, tubing line, 2", 2⅛" and 3" tubing tools mounted on Ford tandem truck; ½ ton Studebaker service pickup. Good running condition. For details, call or write Melco Drilling Company, Phone 2333, Box 1360, Seminole, Oklahoma.

FOR SALE: Wilson Titan—20" Gardner-Denver pump, 14" Gardner-Denver pump, 300-ton derrick equipment, Cameron Blow-out preventer, 10,500' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-202, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE

8⅝" O.D. .322 wall 28,000 ft.
12¾" O.D. .375 wall 26,000 ft.
Reconditioned Line Pipe
18 foot R. L.

NEW ELECTRIC WELD REJECTS

7" O.D.	.317 wall	200 feet
8⅝" O.D.	.352 wall	500 feet
9⅝" O.D.	.385 wall	2,000 feet
16" O.D.	.375 wall	1,400 feet
20" O.D.	.281 wall	1,500 feet
24" O.D.	.281 wall	720 feet
24" O.D.	.406 wall	930 feet
26" O.D.	.281 wall	1,100 feet
26" O.D.	.312 wall	820 feet
26" O.D.	.500 wall	120 feet

All 40 foot lengths
Special Low Price
Write—Wire—Phone

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-148)
Kansas City 18, Kansas
ATwater 9305

FOR SALE EQUIPMENT

MODEL H CARDWELL Servicing Unit. Truck mounted with mast. Fully equipped. Box No. 1 or Phone 153, Canton, Kansas.

FRANKS ETS-500—Single Drum Hoist Less Engine. Sales Price—$1,500. General Appearance—Good. Unit complete with Franks Power Take-Off; Mounted on Steel and Wood Truck Bed. Location of Unit—Winfield, Kansas. Contact Cardwell, Wichita.

FRANKS MODEL 5000 Spudder—Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment. Skid and 65' Double Leg Pipe Mast with 8⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit—Western Kansas. Contact Cardwell, Wichita.

FOR SALE: 12,000' 4" o.d. seamless line pipe. 40' random lengths. Clean inside and out. Beveled ready to lay 35c f.o.b. our yard. M. J. Regan Pipe Co., Coffeyville, Kans.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

SPECIAL LIQUIDATION

TOWERS AND COLUMNS

1—8' O.D. x 61' 6" SS, 15 trays 50#, 300° F.
1—7' 6" O.D. x 55' 6" steel, 30 trays 45#, 300° F.
1—7' I.D. x 42' steel, 20 trays 40#, 150° F.
1—7' I.D. x 25' 6", 10 trays, 50#, 250° F.
1—7' O.D. x 5' O.D. x 70' 4½" steel, 35 trays, 64#, 300° F.
1—6' I.D. x 64' steel, 35 trays, 55#, 300° F.
1—6' I.D. x 45' SS, 15 trays, 850#, 350° F.
1—5' O.D. x 61' 6" steel, 15 trays, 55#, 300° F.
1—4' O.D. x 110' 6" SS, 70 trays, 75#, 300° F.
1—4' O.D. x 72' SS, 40 trays, 55#, 300° F.
1—3' 6" I.D. x 63' steel, 35 trays, 55#, 250° F.
1—2' 6" I.D. x 60' steel, 35 trays, 55#, 300° F.
1—2' O.D. x 75' steel, 45 trays, 55#, 300° F.
1—2' I.D. x 75' steel, 50 trays, 70#, 300° F.

HEAT EXCHANGERS-CONDENSERS

2—1440 sq. ft. 304 S.S. 75# PSIG, 350° F.
1—1345 sq. ft. steel, 70# PSIG, 300° F.
1—1270 sq. ft. steel, 55# PSIG, 350° F.
2—1250 sq. ft. steel, 45# PSIG, 350° F.
2—1125 sq. ft. steel, 850# PSIG, 900° F.
2—1125 sq. ft. 304 S.S., 55# PSIG, 450° F.
1—750 sq. ft. steel, 60# PSIG, 350° F.
1—660 sq. ft. steel, 55# PSIG, 350° F.
1—400 sq. ft. 304 S.S., 75# PSIG, 350° F.
1—340 sq. ft. steel, 55# PSIG, 185° F.

OTHER ITEMS

Complete oxygen plant, 170 ton per day, 90 to 95% pure oxygen.
Two clock gas engines—800 BHP.
Two clock gas engines—150 BHP.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas, Justin 6032

FOR SALE EQUIPMENT

FOR SALE: New Wilson Giant—127' Mast, 18" Oil Well pump, Cameron Blowout preventer, 9,000' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-203, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—One Lee C. Moore, Inc., Cantilever Mast "Substructure" 34' 6" Long, 18' 3" wide and 5' 4" high, complete with 3 adjustable 11 tread stairways with hand rails, and one combination 4' wide ramp with stairway and railing. $2500.00 F.O.B. our McPherson yard. E. K. Carey, McPherson, Kans.

FOR SALE: 1951 Cessna 195; 245 HP; 400 total hours; Cross-wind Gear; VHF; OMNI; Gyros; Hangered; Brand new condition; one owner; $6,500; write Box H-201, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC EQUIPMENT:
Two Mayhew 1000 Heavy duty drill, 5 x 6 pumps; mounted on GMC Trucks, with two water Tank Trucks mounted on GMC Trucks, like new. S. I. E. 24-trace recorder with jugs; shooter's truck; reel truck; two surveyors pickup trucks; station wagon; two alidades; dynamite trailer—all in excellent condition. Never used on contract jobs. Going out of seismic business. Will sell for half invoice prices. Phone 2-1783, McCarty & Coleman, 506 First National Bank Building, Wichita Falls, Texas.

TWIN-SCREW TOW BOAT "Demopolis," 140' x 25' x 10'. Ideal for conversion into quarter boat. All steel construction. Edward Levy Metals, Incorporated, New Orleans, Louisiana. Phone—MA 3778.

2—MOGUL Wilson draw works casing pulling rigs complete with Thrift pump, mud pump and tools. 1—Super Wilson draw works rig with same as above. 1—Stripped down Wilson Super draw works with motor only. Very cheap. 1—1946, 7½ ton White Truck. 2—GMC ¾ Ton Pickups. 1—1 ton Intl. Pickup. 1—8⅝" Landis Pipe Machine. 1—McFarland Pipe Tester. 1—Large assortment Fishing Tools. 3—Steel Warehouse Buildings and Office. 7—Large City Lots. 1—50' Fairbanks-Morse Scales. To inspect contact Joe B. Skeen at Acme Pipe & Supply Co., Overton, Texas. Box 1063. Tel. 4621.

FOR SALE at Reduced Prices: 3 Happy Coolers for 25, 30, and 50 H.P. engines. Joe A. Huitt, Deep Rock Oil Corporation, Tulsa.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C.: 2 unused, 1 slightly used. 11—Sperry 18" x 18" cast iron Filter Presses, 11 chambers. Consolidated Products Co. Inc., #65 Garden Street, Hoboken, N. J. N.Y. Tel.: BArclay 7-0600.

DRILLING equipment. New and used spudders, rotaries, tools. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colorado.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 133—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE EQUIPMENT

WILSON GIANT—Serial No. 6382. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg - McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others — Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

FAILING MODEL 1500 heavy duty drill. Write P. O. Box 819, Longmont, Colorado, for details.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

EQUIPMENT WANTED

WANTED TO PURCHASE: Steam driven forged steel water cooled simplex pump approximately 8 x 5 x 12. Also motor driven steam-jacketed asphalt pumps. Send specifications and price to Box 186, Cordova, Alabama.

WANTED: One good used Shafter 10¾" Double Gate, Hand Operated, Blowout Preventer. One used 7" Cameron L.D.O., Single Gate, Hand Operated, Blowout Preventer. Call or write COFFEE RENTAL TOOL CO., P.O. Box 1334, Phone 6506, San Angelo, Texas.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

MATERIAL WANTED

One 13⅝" Shaffer Blowout Preventer, Type 39. One 10¾" Shaffer Blowout Preventer, Type 39.

MAKIN DRILLING COMPANY
P.O. Box 1628
Hobbs, New Mexico

MONEY RAISING

YOUR FINANCING PROBLEM can most probably be solved. Inquiries invited. Box H-220, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE MAPS

NEW WILLISTON BASIN MAP CONTOURED

DATUM — MISSION CANYON — Along eastern side of basin, contured on LODGEPOLE where Mission Canyon is not present.
This map has been accurately drawn to scale. Tops have been checked on all wells.
Work compiled by Independent Geologist, John H. Lapp.
Basin Area Coverage: North Dakota, South Dakota, Eastern Montana, North East Wyoming; South Eastern Saskatchewan and South Western Manitoba.
Scale 1" — 12 Miles. Size 52"—60"
Price: Paper $35.00 — Linen $70.00.
This map has been released and is for distribution only by:

NORTHWEST MAPPING COMPANY
Box 1234, Bismarck, North Dakota

HELP WANTED

REFINERY PROCESS ENGINEER
Excellent future in Midwest refinery. Age 25-35 with BS degree in chemical or petroleum engineering. Must be thoroughly familiar with modern refinery processes. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

OLD ESTABLISHED DISTRIBUTOR of oil well supplies and oil well pumping equipment has opening for experienced sales engineer, age 35-45. The man who can qualify and has good contacts with the producing division of the oil industry can expect bright future and unusual earnings. References and complete information, which will be kept strictly confidential, must accompany application. Box H-200, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

ENGINEER with experience in field of corrosion to set up and maintain corrosion control program on Gulf Coast off-shore installations for major oil company. Location in Mid-Continent Region. Salary commensurate with experience. Please summarize educational and experience background in first letter. Box H-185, The Oil and Gas Journal, Tulsa, Oklahoma.

THE SUPERIOR OIL COMPANY has an opening in the Geophysical Department, starting as a computer. College degree in Geology, Geological or Petroleum Engineering required plus math through calculus and basic physics. No experience required. Send transcript, photo and letter of application to Personnel Department, The Superior Oil Company, Midland, Texas.

PROCESS ENGINEER
Excellent opportunity in Midwest for young man 25 to 45 with B.S. or equivalent in chemical engineering. General experience in distillation, light ends separations and absorber design desirable. Would participate in new tray design and development. Box H-225, The Oil and Gas Journal, Tulsa, Oklahoma.

OPERATOR wanted to drill Tennessee acreage over Oil-Gas seepage territory. Valuable gas market adjacent. E. A. Munyan, 102 Fairview Drive, Fairfax, Va.

REFINERY OPERATING SUPERVISOR
Modern Midwest refinery undergoing extensive refinery expansion, desires man to assist in supervising fluid cat-cracking polymerization and topping operations. Must have at least five years' experience and college degree. Box H-208, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

REFINERY ENGINEER
Upper Midwest refinery has excellent opportunity for young man. Must have several years' experience in refinery operations or engineering and have degree in chemical or mechanical engineering. Write Box H-206, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGISTS

Major company beginning exploration program in Egypt is accepting applications for the following geological positions:

Research Geologist—regional and local stratigraphic studies; knowledge of micropaleontology; 4 or more years of experience, preferably including foreign.

Photogeologist — experienced in geological interpretation of air photos.

Surface Geologists (3) — 2 or more years of experience in surface mapping.

Junior Geologists (3)—for surface mapping; little or no experience necessary.

Seismograph Geologists (2)—some experience in subsurface and geophysical operations.

Reply, stating qualifications and experence, to:

Box H-216

THE OIL AND GAS JOURNAL

Tulsa, Oklahoma

OVERSEAS OPPORTUNITIES

Affiliates of
STANDARD OIL COMPANY (NEW JERSEY)
located in South America
NEED . . .
OIL REFINERY ENGINEERS

CHEMICAL ENGINEERS
Assignments will include economic studies and preparation of refinery operating programs. Experience using statistical methods desirable.

ELECTRICAL ENGINEERS
Graduate engineers with several years electrical design experience required. Will design electrical installations, including transmission, distribution, control, lighting, and communications systems.

MECHANICAL ENGINEERS
Work assignments will include piping, pressure vessel, pumping, and heat exchange equipment design. Knowledge of cost estimating, material specifications and quantity take off required.

INSPECTION ENGINEERS
Engineering degree and several years oil refinery metals inspection experience. Will inspect oil refinery equipment and request equipment renewals where corrosion, failure, or defectiveness under safety codes makes necessary.

These are regular staff positions offering liberal salaries and benefit plans.

WRITE

giving complete address, age, marital status, education, and details of previous experience. Box 308-T, Radio City Station, New York 19, N. Y.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PETROLEUM OR RESERVOIR ENGINEER

With minimum 3 years experience in development, production and oil and gas reservoir engineering on primary and secondary recovery problems. For New York office of major foreign producer.

MICROPALEONTOLOGIST

Preferably with an advanced degree and a minimum of 5 years' commercial or academic experience. To work in New York research laboratory. This position demands broad interests in Stratigraphy and Biofacies and the capacity to do independent work on projects assigned.

Salary for above positions dependent on experience and qualifications. Write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR

BOX OGJ-11

Arabian American Oil Company

505 Park Avenue

New York 22, N. Y.

SITUATIONS WANTED

CHIEF PETROLEUM ENGINEER: Major company, South America. Production geology and petroleum engineering background, B.S., 37. Have handled important technical and administrative duties for many years. Want job with sound, efficiently managed company, U.S.A. or Canada. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Seven years experience exploration, exploitation, evaluation. Past four years district geologist North and West Central Texas, and Mid-Continent. Three years Gulf Coast experience. Some experience Denver Basin. Prefer Fort Worth, Dallas, or Denver location. Box H-226, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 28, M.S. degree, 1 year field and 2½ years Gulf Coast Multi-Zone reservoir experience. Schlumberger electric log school. Reserves, exploitation, pressure-maintenance and water-drive studies. Desires Houston, Dallas, or Tulsa location. Resume on request, presently employed. Box H-169, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING-PRODUCTION-COMPLETION SUPERINTENDENT, 7½ years' major company experience. Engineering background. Currently employed as Production Superintendent by independent producer desires to make a change. Age 37, married. Box H-223, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

SEISMOLOGIST specializing in reinterpretion desires change. 16 years' experience, 36 years old, φBK, single. Box H-219, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL ACCOUNTANT desires position with independent operator. Experienced in office management, taxes, insurance, finance. Can take full responsibility of office and assume administrative duties. Replies strictly confidential. Box H-215, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER: 6 years' experience in maintenance, design, and construction of Fluid and Thermofor Cat Crackers and Auxiliaries. Desire contact with refiner or contractor. Box H-218, The Oil and Gas Journal, Tulsa, Oklahoma.

FIELD SUPERINTENDENT or GENERAL MANAGER: B.S. degree, ten years varied experience in drilling and production. Presently employed as manager of consulting engineering and well operating company. Box H-197, The Oil and Gas Journal, Tulsa, Oklahoma.

WYOMING OIL GEOLOGIST, 14 years' comprehensive exploratory background, 9 years in Rockies, wants full or part time position in Casper. Box H-199, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE Geologist in Tulsa, 30, married, 4 years subsurface and surface experience with major and independent, desires permanent position with aggressive independent or consultant. Box H-224, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P.O. Box 487, Wilmington, Delaware.

BUSINESS OPPORTUNITIES

FOR SALE: Well established Pipe Service Co. All equipment in excellent condition. Gross $80,000 1953. Several major company contracts, franchise on part of service, specializing pressure testing, cleaning, threading, etc. Low overhead, best location in Mid-Continent Area. Box H-222, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

OIL ROYALTY
In Colorado's Hot Spot, Weld County; will sell up to 100 Ac. Personally owned minerals under Major Co.'s lease. Perpetual Particp. Also an attractive lease in their block. Guy J. Stumpff, Pet. Eng., Box 278, Aurora Br., Denver, Colo.

JACK EAGLE, Oil Properties. 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

3000 ACRES. Northfield-Macedonia-Twinsburk townships, Summit County, Ohio. Want Trenton test, 4600'. Excellent geology. Small override. W. J. Smith, 3559 East Blvd., Cleveland 5, Ohio. Phone: Michigan 1-1736.

OIL MEN — INVESTORS
SOUTHWEST WYOMING
MAJOR STRUCTURE—parallel to important producing oil fields, to drill. Recommend leases or royalty on structure this important area. Complete technical data on request.
W. J. PETERMAN, Geologist
1918-1954
Portales — New Mexico

LEASE AND DRILLING BLOCKS

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WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

WANTED by responsible independent oil company small depleted reservoir for secondary recovery studies. Require structural closure and gas expansion drive. Prefer shallow, clean sand; small ownership division. Box H-217, The Oil and Gas Journal, Tulsa, Oklahoma.

THIRTEEN wells on 80 acres, Bird Creek Pool, north of Tulsa, six miles from Flat Rock Water Floods described in Oil and Gas Journal May 3. Production from Bartlesville and Tucker sands. 1,250 T.D. Will be sold on bids. Write A. J. Geiger, Route 15, Box 57, Tulsa, Okla.

FOR SALE: MONTANA MINERAL INTERESTS: Lower price range, well located. Good return from lease rentals. To Texas Residents only. N. R. Brasted, 816 Sinclair Building, Fort Worth, Texas.

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FOR SALE: 320 acres plus ½ mineral. 8 miles south of Elk City. Box 7561, Lakeside Station, Oklahoma City 16, Okla.

160-ACRE lease Stephens County, Okla. for sale or development. 2 flowing wells high production on adjoining land. Address Box 572, Chickasha, Okla.

OFFSET farmout, lease, drilling blocks available in several counties, shallow to deep production, also sulphur prospect. Particulars H. Priesmeyer, Garwood, Tex.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

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Box H-205, The Oil and Gas Journal, Tulsa, Oklahoma

WILDCAT COMPLETIONS

(Continued from page 153)

C NE NE SW 6-10n-13w. IP 3,500 M.c.f. of gas per day plus 637 bbl. condensate per million, 55.3°, Travis Peak 6,910-24 ft. TD 6,981 ft. (Benson area gas-condensate discovery) BHPSI 3343.

Grant Parish: Gulf Refining Co. 1 Strong, 33-9n-1e. Dry. TD 3,715 ft.

Union Parish: W. C. Feazel 1 Tonway Smith, C NE SW 18-21n-2w. IPF 34 BCPD, 12/64-in. choke, 52°, GOR 1823:1, Smackover 10,410-462 ft. TD 10,860 ft. (New condensate pay in Bernice field).

ARKANSAS

Johnson County: Western Natural Gas Co. 1 Chas. Bryant, 19-9n-23w. IP 176 M.c.f. of gas per day, TPSI 800. 4,850-5,000 ft. TD 2,350 ft. (Shut-in gas well.)

Miller County: McAlester Fuel Co. A-1 Sturgis, C SE SE 12-17s-27w. Dry. TD 5,578 ft.

Union County: Lawton Oil Corp. 1 Newsom, 35-18s-14w, South Hibank field. IPF 132 BOPD, Pettit 3,196-3,200 ft., 12/64-in., 44°. TD 3,724 ft. (New pay discovery.)

OKLAHOMA

Beaver County: Sinclair 1 Alexander, SW SW NW 28-2n-27eCM. Dry. TD 8,173 ft.

Carter County: Charlie Dobbins and Fred Tucker 1 Robinson, NW SW SW 4-1s-2w. Dry. TD 2,160 ft.

C. W. Van Eaton et al 1 Winters, SW SE SE 12-5s-1w. IPP 100 BOPD, Deese 3,510-21 ft., 35°. TD 5,027 ft. (Oil discovery.)

Cleveland County: D. D. Feldman Oil Co. 1 Thrilkeld, NW NW NE 29-6n-1w. Dry. TD 8,532 ft.

Jackson County: Hafeloff & Elliott 1 Hickman, NE NE NE 2-1n-19w. Dry. TD 1,982 ft.

Lincoln County: Sunray Oil Corp. 1 State School Land "G," NE NE SW 16-12n-4e. Dry. TD 4,945 ft.

Osage County: Anderson-Prichard Oil Corp. 1 Osage (Tract 254), SW SW NW 22-25n-7e. Dry. TD 2,638 ft.

Payne County: The Oil Capitol Corp. 1 Newport, NW SW SE 3-17n-3e. Dry. TD 4,580 ft.

Pottawatomie County: Ohio Oil Co. 1 Stapp, NW SE NE 17-9n-2e. Dry. TD 6,401 ft.

Seminole County: Wm. R. Whittaker Co., Ltd., 1 Thorn, SW NE NW 2-7n-5e. Dry. TD 4,715 ft.

Stephens County: Jackson Drilling Co. 1 Norman, NE NE SW 14-2s-6w. TD 4,590 ft.

Texas County: The Texas Co. 1 Morris, SE SE NW 29-2n-19eCM. Dry. TD 6,850 ft.

KANSAS

Cowley County: Gough Davis 1 Walker, SE SE SW 8-32s-8e. Dry. TD 2,739 ft.

Dickinson County: Lance Hill et al 1 Woods, NW NW NE 16-16s-1e. Dry. TD 2,782 ft.

Graham County: Wick Petroleum Co. 1 Lowenstein, NE NW NE 31-10s-24w. Dry. TD 4,340 ft.

Greeley County: United Producing Co. 2 Hiebert, NE NW NW 5-17s-42w. Dry. TD 1,272 ft.

McPherson County: Rupp-Ferguson 1 Kornelson, SW SW SW 20-21s-4w. Dry. TD 4,008 ft.

Marion County: R. B. McGuire 1 Lovelace, CE½ E½ E½ 2-19s-4e. Dry. TD 2,384 ft.

Norton County: Sohio Petroleum Co. 1 Schandler, NE NE NE 28-4s-23w. Dry. TD 3,874 ft.

Pawnee County: Imperial Drilling Co. 1 Conrad, NE NE NW 30-20s-17w. Dry. TD 4,077 ft.

Pratt County: Natural Gas & Oil Corp. 1 Shriver, SW SE NW 16-26s-11w. Dry. TD 4,463 ft.

Rooks County: Isern Drilling Co. 1 Jones, NE NE NW 27-6s-19w. Dry. TD 3,618 ft.

Veeder Supply Co. 1 Garrett, NE NE SE 26-9s-18w. Dry. TD 3,694 ft.

Sedgwick County: The Texas Co. 1 Casner, NW NE NE 33-29s-4w. Dry. TD 4,383 ft.

NEBRASKA

Cheyenne County: S. D. Johnson 1 Krueger, SW SW NW 4-13n-48w. Dry. TD 4,770 ft.

Ohio Oil Co. 1 Lobb, NW NW SW 3-12n-51w. IP 3,070 M.c.f. of gas per day, "D" sand discovery, new pool, TD 5,160 ft. (Lorenzo pool.)

Ohio Oil Co. 1 O'Connell, NE NE SW 31-13n-50w. IPP 56 BOPD, "J" sand oil discovery, new pool in West Sidney area. TD 5,073 ft.

Garden County: Shell Oil Co. 1 Cabella, SE SE SE 4-15n-44w. Dry. TD 3,786 ft. in "J" sand.

Kimball County: D. P. Neal and New Drilling Co. 1 Goodwin, SE SE SE 2-13n-54w. Dry. TD 5,985 ft.

CALIFORNIA

Fresno County: F. M. Taylor, operator 34-10F, 10-20s-16e. Dry. TD 9,146 ft.

Glenn County: R. S. Rheem, operator 1 Pfeiffer, 11-22n-2w. Dry. TD 4,807 ft.

Kern County: Li-Jo Oil Co. 32-2 "Well," 32-9n-17w. Dry. TD 1,602 ft.

Reserve Oil & Gas Co. 42-34 Reserve-Pauly, NE NW 34-11n-19w, IPF 785 BOPD rate, 20/64-in. choke, 29.6°-gravity, perfs, 5,657-5,743 ft. in Olcese sand

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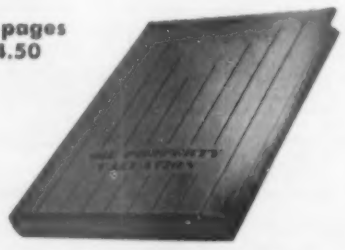

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BOX 1260 • TULSA, OKLA.

(Miocene), TD 5,744 ft. (New pool discovery in Tejon Reserve area.)

Standard Oil Co. of California 55-21 Tejon Ranch-3, 21-11n-18w. Dry. TD 2,015 ft.

Los Angeles County: T. F. Vander Laan, operator 1 Vander Laan, NW NW 30-2s-13w, IPP 60 BOPD, 23°-gravity, 3,370-3,600 ft., OWRD, new TD 4,843 ft., PB 3,600 ft. (New fault-block pool in Sansinena field.)

Merced County: Hilmar Comm. Oil & Gas Co. 1 Fausone, 25-6s-10e. Dry. TD 3,006 ft.

Nev-Tah Oil & Mining Co. 1 Artigues, 2-12s-10e, bottomed in Cretaceous. Dry. TD 2,505 ft.

Monterey County: Humble Oil & Refining Co. 1 A. J. Zabala, 34-18s-6e. Dry. TD 5,955 ft.

Riverside County: H & W Assoc., Ltd., 1 Marie Boyd, 28-4s-6w. Dry. TD 905 ft.

Santa Barbara County: C. W. Colgrove 11A Russell, 24-10n-27w. Dry. TD 5,790 ft.

Sunray Oil Corp. 1 Bishop, 7-4n-28w. Dry. TD 3,300 ft.

Stanislaus County: Tejon Hills Co. 1 Stan, 15-7s-8e. Dry. TD 4,687 ft.

Ventura County: Standard Oil Co. of California 1 Lucas, 12-1n-22w, IPP 108 BOPD, 34.3° gravity, perfs. at intervals 8,498-9,025 ft., TD 10,570 ft. (New pool discovery, transitional Sespe sand, in Oxnard area.)

Sunray Oil Corp., operator 1 Fasshauer, 5-2n-20w. Dry. TD 10,060 ft.

WYOMING

Carbon County: Sinclair Oil & Gas Co. 1 Hansen Ridge Unit, SE SE NW 30-19n-89w. Dry. TD 10,510 ft. in Tensleep.

Converse County: Bennett & Steele 1 Bixby-Carey, C SW NW 20-33n-74w. TD 6,096 ft. in Dakota.

Niobrara County: Beach & Talbot 30-1 Government-Jarvis, C NW NE 30-40n-65w. Dry. TD 7,640 ft. in Dakota.

Great Basins Petroleum 14-7 Government, C SW SW 7-38n-65w. Dry. Fish abandoned in hole. TD 7,956 ft. in Dakota.

Great Basins Petroleum 41-20 Government, C NE NE 20-39n-65w. IPF 220 BOPD, Newcastle discovery, new field. TD 7,559 ft. in Newcastle.

Uinta County: Wasatch Petroleum 1 Government, NE NE SE 26-16n-121w. Dry. TD 5,010 ft. in Beckwith.

COLORADO

Adams County: Continental Oil Co. 1 Dinnesen, NE NW SW 34-1s-57w. Dry. TD 5,707 ft.

Gem Oil Co. 1 Swenney et al, SE SE NE 10-1s-57w. Dry. TD 5,611 ft.

Ginther-Warren & Ginther 1 UPRR Flader Unit "C," SW SW SE 9-3s-59w. Dry. TD 6,274 ft.

Logan County: British-American B-1 Arford, C NW NE 21-9n-54w. Dry. TD 5,368 ft.

McDermott & Barnhart 1 Armstrong, C SW NE 34-9n-53w. IPP 199 BOPD, "J" sand discovery, new field. TD 5,000 ft.

Swedlund & Prince Bros. Drilling Co. and Rowland 1 Jordan, SE SW NE 6-7n-54w. Dry. TD 5,335 ft.

Morgan County: Bridwell Oil Co. 1 State, C SW NW 20-2n-57w. Dry. TD 5,700 ft.

Russell Johnson and Tuley & Carter and Barnes & Brown 1 Wainscott, NW NW NW 17-2n-57w. Dry. TD 5,727 ft.

Thornton Lomax 1 Hayward, SW SW SW 9-6n-59w. Dry. TD 6,839 ft.

Sharples-Exploration Drilling Co. and V. H. Simmons 1 Peterson, SE SE NW 10-2n-56w. Dry. TD 5,370 ft.

Shell Oil Co. 1 Christensen, SW NW SE 15-5n-57w. Dry. TD 5,984 ft.

Montezuma County: Continental Oil Co. 1 Ute Mountain, SE NW NW 7-32n-19w. Dry. TD 7,227 ft. in granite.

Washington County: Harper-Turner and Dunn & Boreing 1 Brinkhart, C SE SW 17-5n-54w. Dry. TD 5,073 ft.

Plains Exploration 1 Grau, SW SW SW 25-1s-54w. Dry. TD 5,255 ft.

Weld County: British-American 1 Henrich, SE SE SE 14-7n-61w. Dry. TD 8,675 ft.

Eddie Fisher 1 Carter, NE NE NW 33-12n-57w. Dry. TD 6,763 ft.

SASKATCHEWAN

Tide Water 1 Blum Crown, LS D13, 11-12-13w3. Dry. TD 4,211 ft.

Canada Southern 5-21 Boxelder Creek, LSD 5, 21-11-29w3. Dry. TD 6,685 ft.

Socony-Sohio 32-7 Burnbrae, LSD 7, 32-5-12w3. Dry. TD 4,777 ft.

Socony-Sohio 29-4 South Saltcoats, LSD 4, 29-22-3w2. Dry. TD 3,220 ft.

Tide Water 1 Tuberose Crown, LSD 16, 17-22-15w3. Dry. TD 2,810 ft.

ALBERTA

Federated et al 1 Sylvester Creek, LSD 11, 30-43-12w5. Dry. TD 9,429 ft.

New British 1 Comrey, LSD 6, 15-3-6w4. Dry. TD 3,480 ft.

Western 21-11 Greencourt, LSD 11, 21-59-8w5. Dry. TD 8,553 ft.

Chancellor Syndicate-Socony-CPR 1 Hussar, LSD 6, 25-23-20w4. Dry. TD 4,802 ft.

Calvan 6-12 Oyen, LSD 6, 12-29-4w4. Dry. TD 3,400 ft.

Hercon 3-8 Nuco, LSD 3, 8-45-22w4. Dry. TD 6,050 ft.

BRITISH COLUMBIA

Pacific 1 Kiskatinaw, LSD 10, 5-81-15w6. Dry. TD 5,695 ft.

Oil Production Opened in Sullivan's Lake Gas Field

Oil production has been established in the Sullivan's Lake area, of Iberville Parish, South Louisiana, where two previously completed wells have yielded gas and condensate.

The new discovery, made by Union Producing Co. at its 1 Templeton et al., ½ mile north of the two gas-condensate wells, is in a new pay zone, perforated at 12,343-45 ft., 1,300 ft. deeper than the 11,000-ft. gas-condensate sand. A flow of 390 bbl. of oil per day at pressure of 2,950 psi. was recorded through ¼-in. choke. Gas-oil ratio was only 630 cu. ft. per barrel.

Union opened the field's gas-condensate production about a year ago, and confirmed it last November. It is starting its fourth test, 1-A Schwing, located 2,300 ft. northwest of the new oil discovery.

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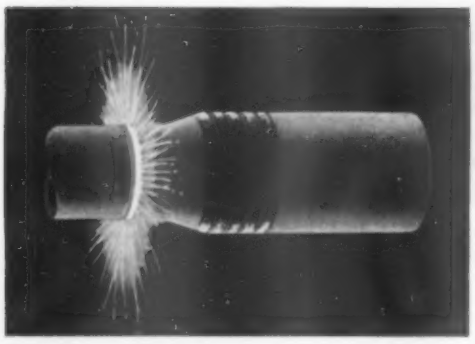

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